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Annual INTEC Water Monitoring Report for Group 4—Perched Water (2003)



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**Prepared for the
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ABSTRACT

This report describes the monitoring activities conducted and presents the results of perched groundwater sampling and water-level measurements from August 2002 through July 2003. Perched groundwater samples were collected from 12 wells and 5 lysimeters from the Idaho Nuclear Technology and Engineering Center (INTEC) and the Central Facilities Area and analyzed for iodine-129, strontium-90, tritium, technetium-99, uranium isotopes, plutonium isotopes, neptunium-237, americium-241, gamma spectrometry, metals (filtered and unfiltered), anions, and alkalinity.

Iodine-129, tritium, and strontium-90 were the radiological analytes above their respective maximum contaminant levels (MCLs). Iodine-129 was detected just above its MCL of 1 pCi/L in one perched well. Strontium-90 was above its MCL of 8 pCi/L in several perched wells near the tank farm in the northern part of INTEC. Tritium was above its MCL in one well in the southern part of INTEC.

Several metals, including chromium, lead, and arsenic, were detected at concentrations above their respective MCLs in unfiltered samples but were below MCLs in filtered samples, indicating that elevated metals are associated with suspended particulates.

Nitrate was detected above its MCL in several shallow perched water samples near the tank farm in well MW-24 and in the deep well MW-1-4.

Water-level measurements were taken from perched wells in the Idaho Nuclear Technology and Engineering Center to evaluate the extent of perched water bodies and potential recharge sources. Water levels dropped sharply in the wells near the former percolation ponds after the flow was diverted to the new percolation ponds. The deep well MW-17-4 appears to be at least partially affected by the diversion of flow from the former percolation ponds. Wells in the northern part of INTEC near the tank farm do not appear to be affected by shutting off water to the percolation ponds.

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ACRONYMS

BLR	Big Lost River
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CS	Central Set
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office (now NE-ID)
FFA/CO	Federal Facility Agreement and Consent Order
ICPP	Idaho Chemical Processing Plant
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MCL	maximum contaminant level
MDA	minimum detectable activity
MSIP	Monitoring System Installation Plan
MWTS	Monitoring Well and Tracer Study
OU	operable unit
ROD	Record of Decision
STL	Sewage Treatment Lagoon
SRPA	Snake River Plain Aquifer
TF	Tank Farm
USGS	United States Geological Study
WAG	waste area group

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1. INTRODUCTION AND PURPOSE

The purpose of this document is to report perched water sampling results, water-level measurements, and tensiometer data. These data were collected to support the Waste Area Group (WAG) 3, Operable Unit (OU) 3-13, Group 4–Perched Water monitoring at the Idaho Nuclear Technology and Engineering Center (INTEC) from August 2002 through July 2003. The OU 3-13, Record of Decision (ROD) calls for Group 4 to monitor and assess the perched water drain-out and contaminant ~~flux~~ into the Snake River Plain Aquifer (SRPA) (DOE-ID 1999). The *Field Sampling Plan for OU 3-13, Group 4, Perched Water Well Installation* (DOE-ID 2003a) and the *Long-Term Monitoring Plan for OU 3-13, Group 4 Perched Water* (DOE-ID 2000) specify the wells to be sampled and the parameters for analysis based on the data requirements identified in the ROD (DOE-ID 1999). The data quality objectives (DQOs) for the groundwater sampling are described in the Monitoring System and Installation Plan (MSIP) for Group 4 (DOE-ID 2003b).

A comprehensive report titled *Phase I Monitoring Well and Tracer Study Report for OU 3-13, Group 4 Perched (MWTS)* (DOE-ID 2003c) was prepared in 2003 to assess the results from the Group 4, Phase I activities. The MWTS incorporated monitoring data up to August 2002 and provides details about the Phase I activities and methodology, stratigraphy and geotechnical results, alluvium and interbed chemistry, tracer tests, well completions reports, conceptual models, and an extensive appendix of historical analytical results from perched water monitoring wells.

1.1 Regulatory Background

The Idaho National Engineering and Environmental Laboratory (INEEL) is divided into 10 WAGs to manage environmental operations mandated under the *Federal Facility Agreement and Consent Order* (FFA/CO) (DOE-ID 1991). INTEC, formerly the Idaho Chemical Processing Plant (ICPP), is designated as WAG 3. Operable Unit 3-13 encompasses the entire INTEC facility.

In October 1999, the ROD was issued for OU 3-13, which includes the INTEC perched and groundwater systems (DOE-ID 1999). The Group 4 selected remedy is institutional controls with aquifer recharge controls (DOE-ID 1999). The remedial actions chosen in the ROD are in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (42 USC §9601) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. In addition, remedies comply with the National Oil and Hazardous Substances Pollution Contingency Plan (55 FR 8665) and are intended to satisfy the requirements of the FFA/CO.

Under the FFA/CO, the U.S. Environmental Protection Agency, the Idaho Department of Environmental Quality, and the U.S. Department of Energy (DOE) are directing cleanup activities to reduce human health and environmental risks to acceptable levels at INTEC.

1.2 Site Background

The INEEL is a government-owned facility managed by the DOE. The eastern boundary of the INEEL is located 52 km (32 mi) west of Idaho Falls, Idaho. The INEEL Site occupies approximately 2,305 km² (890 mi²) of the northwestern portion of the Eastern Snake River Plain in southeast Idaho. The

INTEC facility covers an area of approximately 0.39 km² (0.15 mi²) and is located approximately 72.5 km (45 mi) from Idaho Falls, in the south-central area of the INEEL as shown in Figure B-1 (Appendix B).

INTEC has been in operation since 1952. The plant's original mission was to reprocess uranium from defense-related projects and to research and store spent nuclear fuel (SNF). The DOE phased out the reprocessing operations in 1992 and redirected the plant's mission to (1) receipt and temporary storage of SNF and other radioactive wastes for future disposition, (2) management of current and past wastes, and (3) performance of remedial actions.

The liquid waste generated from the past reprocessing activities is stored in an underground tank farm. Numerous CERCLA sites are located in the area of the tank farm and adjacent to the process equipment waste evaporator. Contaminants found in the interstitial soils of the tank farm are the result of accidental releases and leaks from process piping, valve boxes, and sumps. No evidence has been found to indicate that the waste tanks themselves have leaked. The contaminated soils at the tank farm comprise about 95% of the known contaminant inventory at INTEC. The comprehensive remedial investigation/feasibility studies for OU 3-13 (DOE-ID 1997a, 1997b, 1998) contain a complete discussion of the nature and extent of contamination. The tank farm soils will be investigated under the OU 3-14 remedial investigation, and the OU 3-14 draft remedial investigation work plan is currently in preparation.

1.3 Environmental Setting

The land surface at INTEC is predominantly flat and has an elevation of approximately 1,498 m (4,914 ft). The mean annual precipitation at INTEC is approximately 22.1 cm/yr (8.7 in./yr), of which usually less than half occurs as snowfall. The Big Lost River (BLR) is located adjacent to the northwest corner of INTEC and flows intermittently (but did not flow at all in 2002 and 2003). When the BLR does flow, most of the water infiltrates into the material beneath the river and eventually into the SRPA, located approximately 137 m (450 ft) below ground surface (bgs).

Perched water bodies exist at various depths within the 137-m (450-ft) thick vadose zone beneath INTEC. The perched water zones beneath INTEC may result from discharges to the former percolation ponds, natural flows from the BLR, discharges to the sewage treatment lagoons, line losses from the facility water distribution system, and infiltration from lawn irrigation and rain and snowmelt. Until August 26, 2002, when the new percolation ponds were activated, the former percolation ponds had received all plant service wastewater since use of an injection well (Site CPP-23) was discontinued in 1984. The former percolation ponds have been dry since August 2002.

2. MONITORING PROGRAM AND RESULTS

The WAG 3, Group 4 monitoring activities consisted of perched water sampling, manual water-level measurements, and automated (data logger) water-level and tensiometer measurements. Perched water sample collection took place from February 17 to March 6, 2003, and from May 19–29, 2003. The two sampling windows were to allow for repairs on monitoring wells and for the potential rewetting of dry wells from spring snowmelt. Manual water-level measurements were taken monthly from November 2002 through July 2003. Nineteen wells had data loggers that recorded measurements every 30 minutes and were downloaded quarterly. The perched water sampling, water-level data, and tensiometer data are described in the following sections.

2.1 Perched Groundwater Sampling Results

The perched water wells and lysimeters covered by this sampling event are identified as the Phase IIA wells in the *Field Sampling Plan for Operable Unit 3-13, Group 4, Perched Water Well Installation* (DOE-ID 2003a). Samples were collected from 17 perched wells and lysimeters (Figure B-2, Appendix B). The list of wells and lysimeters sampled is given in Table B-1 (Appendix B). Samples were not obtained from some wells, because the wells were dry or went dry during purging and did not recover within an hour. Samples were not obtained from USGS-50 because of pump failure. In addition, due to lack of water at some locations, inadequate sample volumes were collected, resulting in a partial list of obtained analytes. The analytes collected at each location are summarized in Table B-1 (Appendix B).

Perched groundwater samples were analyzed for tritium, Sr-90, I-129, uranium isotopes, plutonium isotopes, technetium-99 (Tc-99), americium-241 (Am-241), metals (filtered and unfiltered), anions, and gamma spectrometry in accordance with Phase IIA sampling. Analytical results for perched water samples are included as Appendix A. Tables B-2 through B-4 (Appendix B) summarize the radiological metals and anion data. Throughout the text of this report, the concentrations (activities) for radiological analytes are provided without the analytical uncertainties. The analytical uncertainties associated with the reported radiological results are provided in Appendix A and Table B-2.

The primary radiological contaminants detected in the perched water were Sr-90, tritium, and Tc-99. The results for these parameters are summarized in Table B-2 (Appendix B). Only wells from which a sample could be obtained are included in these tables (wells or lysimeters not included were *dry* at the time of sampling). The distributions of the primary radiological contaminants, including Sr-90 and tritium, and are shown in Figures B-3 and B-4 (Appendix B). In the sections below, perched water data are compared to MCLs when an MCL is available. The comparison is not intended to convey that the perched water is an aquifer capable of sustained long-term use.

The primary nonradiological contaminants were nitrate and chloride. The distribution of nitrate in the perched water is shown in Figure B-5 (Appendix B).

2.1.1 Northern Shallow Perched Water Sampling Results

The northern shallow perched water can be divided into two principal zones. The upper portion of the shallow perched water zone is associated with interbeds at approximately 33.5 m (110 ft) bgs and the lower shallow perched water zone at a depth of approximately 42 m (140 ft). Seven wells, MW6-2, 37-4, 33-4, 33-2, MW-2, MW-5, and 55-06, in the upper perched zone were sampled and one well, MW-20-2, was sampled in the lower shallow perched zone. Well MW-24 associated with the sewage treatment lagoons is also included in the northern shallow perched zone.

The most significant radionuclide in terms of concentration detected in the northern upper perched water body is Sr-90. Sr-90 was detected in all wells completed in the northern area of the upper perched water zone except for MW-24. The highest Sr-90 levels in the upper shallow perched water occur in the vicinity of the tank farm, especially in MW-2, MW-5, and 55-06 (Figure B-6). The maximum Sr-90 concentration detected was 147,000 pCi/L (MW-2) followed by 35,800 pCi/L (55-06) and 19,000 pCi/L (MW-5). MW-20-2, the only well completed in the lower shallow perched zone, also contained elevated Sr-90 at 18,200 pCi/L. The concentration trends for Sr-90 in MW-2 and MW-5 generally show decreasing concentrations, but 55-06 shows concentrations remaining nearly the same or with no trend (Figure B-6).

Iodine-129, at a concentration of 1.29 pCi/L, was present at 33-2 above its maximum contaminant level (MCL) of 1 pCi/L. Iodine-129 was only detected in one other sample, MW-5, at 0.715 pCi/L. Iodine-129 was at 0.179 pCi/L at MW-5 in 2001 and 33-2 was not sampled in 2001.

Low levels of tritium were also detected in five wells screened in the upper perched water zone. Except for MW-2 with a concentration of 7,180 pCi/L, tritium concentrations were less than 2,000 pCi/L at the other four wells in which it was detected.

Tc-99 was not detected in the upper shallow northern perched water; however, Tc-99 has historically been detected in all wells except 33-4 and MW-6. The maximum Tc-99 concentration was found in the lower shallow perched water zone at 48.7 pCi/L in well MW-20-2. Higher levels of Tc-99 have been historically associated with the lower shallow perched water. The Sr-90, Tc-99, and tritium concentrations were generally more than a third lower in 2001 than in 1995, but the 2003 concentrations are similar to the 2001 concentrations.

Neptunium-237 was detected only at perched well MW-24, but this was an isolated occurrence near the detection limit and Neptunium-237 was not detected in a duplicate sample (Table B-4). Plutonium-238 was detected in 55-06, but the concentration was near the detection limit and no other plutonium isotopes were detected at 55-06. Plutonium-241 was detected at well 33-4-1 (16.5 pCi/L) near the detection limit, but no other plutonium isotopes with lower detection limits were detected at 33-4-1 making the Pu-241 detection suspect.

Uranium-233/234 and uranium-238 isotopes were detected in all samples (Table B-4). Concentrations were similar in most wells, except that 33-2 was marginally higher. All wells, except 33-2, are within background limits for total uranium determined by the United States Geological Survey (USGS) for the SRPA of 0 to 9 pCi/L suggesting that the concentrations are background. The slightly higher uranium concentration in 33-2 may be due to suspended solids because the total uranium concentration was 135 µg/L in the unfiltered sample, but was below detection limits of 26 µg/L in the filtered sample. Uranium-235/236 was detected in four samples, but all the detected concentrations were similar and near the minimum detectable activity (MDA).

Several metals, including lead, arsenic, and chromium, were elevated above MCLs in the unfiltered northern shallow perched water (Table B-3, Appendix B). However, the metals concentrations decreased significantly in the filtered samples and were below MCLs indicating that the metals in the unfiltered samples are associated with suspended solids. That metals are associated with suspended solids is also evident in the high iron and aluminum concentrations associated with unfiltered samples. In filtered samples, iron and aluminum were below secondary MCLs of 300 and 200 µg/L, respectively, in all samples except for 33-4. At 33-4, iron was reported at 598 µg/L. The decrease in concentrations of iron, aluminum, and other metals is consistent with previous determinations of near neutral pH and oxidizing redox conditions. The boron sampling data show that boron is elevated in MW-2, MW-5 and 55-06. These are also the wells with the highest Sr-90 concentrations.

Nitrate was above its MCL of 10mg/L-N in 37-4 and MW-2 on the eastern side of the tank farm and 33-4-1 on the northern side of the tank farm (Table B-5, Appendix B). The concentration of nitrate has been consistently elevated in 37-4 and MW-2 (Figure B-7, Appendix B). Well 33-4-1 has not been sampled since 1995, but nitrate concentrations have also been consistently high in this well. Well MW-24, located near the sewage treatment lagoons, was also above the nitrate MCL of 10mg/L-N.

Chloride was elevated at MW-24 and 33-2 while sulfate was elevated at 37-4, but all results for shallow northern perched water were below both the chloride and sulfate secondary MCLs of 250 mg/L (Table B-5).

The data for the field measured parameters, including temperature, pH, and specific conductance, are summarized in Table B-6.

2.1.2 Central and Southern Shallow Perched Water Sampling Results

Wells that monitor the perched water quality in the southern upper perched water zone around Building CPP-603 include MW-7, -9, -13, -14, -15, -16, and -17. The only well sampled from the CPP-603 area was MW-17-2. The shallow perched wells around the former percolation ponds were *dry* at the time of sampling in February and May 2003. The CS-CH well was sampled in the central part of INTEC. The results for the lysimeters are described in Section 2.1.4.

Tritium was detected in MW-17-2 (55.5 to 58.5-m (182- to 192-ft bgs) at 33,800 pCi/L and is the highest tritium concentration in all the perched water at INTEC. The tritium concentration in MW-17-2 is less than the 40,400 pCi/L detected in 2001 but above the MCL of 20,000 pCi/L. The trend in tritium at MW-17-2 is shown on Figure B-8 (Appendix B). Historically, Sr-90, U-234, and Tc-99 have also been detected in other CPP-603 wells when sufficient water was available for sampling (DOE-ID 1998).

Plutonium-241 was detected at MW-17-2 (9.54 pCi/L) near the detection limit and far below the Pu-241 MCL of 300 pCi/L (Table B-4). Other plutonium isotopes with lower detection limits were not detected at this location making the detection of Pu-241 suspect. Plutonium isotopes had not been detected at this location before.

Similar to the northern shallow perched wells, metals in MW-17-2 were elevated in the unfiltered samples, but concentrations were significantly lower in the filtered samples (below MCLs), indicating that the metals in the unfiltered samples are associated with suspended solids (Table B-3, Appendix B). Manganese was elevated in CS-CH at 194 µg/L and was above its secondary MCL in the filtered sample.

Unlike the northern shallow perched water, nitrate was not elevated above its MCL in MW-17-2, but the sulfate concentration in MW-17-2 was elevated in comparison to the northern shallow wells (Table B-5). The low chloride concentration in MW-17-2 suggests that the former percolation ponds are not the source of the water in this well, because the water that went into the former percolation ponds had high chloride concentrations.

The data for the field measured parameters, including temperature, pH, and specific conductance, are summarized in Table B-6.

2.1.3 Deep Perched Water Sampling Results (–380 ft)

MW-1-4 was the only deep perched well sampled in 2003. Pump problems prevented sampling USGS-50. The rest of the deep perched wells were *dry* or did not contain enough water to sample. Contamination in the deep portion of the vadose zone is different in composition from the upper

perched zones. A substantial database concerning radioactive contaminants is available for the water quality from USGS-50, but a sample was not obtained in 2003 from USGS-50 due to pump problems.

The most significant radionuclide contaminants in the deep perched water are Sr-90 and tritium. The tritium concentrations in the deep perched water zone are probably associated with the waste stream that was directed to the former INTEC injection well (Site CPP-23). The tritium in MW-1-4 shows a trend of decreasing concentrations (Figure B-8, Appendix B). The concentrations of tritium and Sr-90 in MW-1-4 are below their MCLs of 20,000 and 8 pCi/L, respectively.

Uranium-233/234 and uranium-238 isotopes were detected but concentrations were within background limits for total uranium determined by the USGS for the SRPA of 0 to 9 pCi/L suggesting that the concentrations are background (Table B-4).

As noted above for the shallow perched wells, metals in MW-1-4 were elevated in the unfiltered samples but concentrations were significantly lower in the filtered samples and were below MCLs indicating that the metals in the unfiltered samples are associated with suspended solids (Table B-3, Appendix B).

Nitrate concentrations are elevated in MW-1-4 at 58 mg/L and are well above the MCL of 10 mg/L-N. The concentration of nitrate in MW-1-4 shows a trend of slightly decreasing concentrations over time (Figure B-7, Appendix B).

The data for the field measured parameters, including temperature, pH, and specific conductance, are summarized in Table B-6.

2.1.4 Lysimeter Sampling Results

The lysimeter data are discussed separately, because the data may not be directly comparable to samples from saturated monitoring wells. Lysimeters within the tank farm were not sampled. The lysimeters that were sampled are CS-AL, STL-AL, TF-AL, PP-SP, and PP-AL. Partial samples were obtained from the lysimeters with the analytes sampled given in Table B-1, Appendix B. The lysimeter locations are shown on Figure B-2, Appendix B. A summary of lysimeter data is included in Tables B-2 through B-4, Appendix B. A complete listing of lysimeter data is in Appendix A.

Relative to concentrations found in perched water monitoring wells, nitrate and sulfate concentrations in the shallow STL-AL lysimeter were elevated at 127 mg/L and 190 mg/L, respectively. However, chloride concentrations in the STL-AL lysimeter were relatively low at 26.6 mg/L. Low chloride compared to high nitrate and sulfate is not consistent with infiltration from the sewage treatment lagoons at MW-24 where chloride concentrations are considerably greater than nitrate and sulfate concentrations. Tritium and Tc-99 were both nondetect at the STL-AL.

The CS-AL lysimeter had elevated sulfate, nitrate, and sodium concentrations relative to the concentrations in well CS-CH and other shallow perched wells. The chloride concentration was anomalously low at 8.51 mg/L. Tritium and Tc-99 were both nondetect.

The concentrations of nitrate (78 mg/L), chloride (161 mg/L) and sulfate (569 mg/L) were elevated in the TF-AL lysimeter relative to the concentrations in perched wells in the tank farm area (Table B-5, Appendix B). Tritium and Tc-99 were below detection limits in TF-AL.

The PP-AL lysimeter contained an elevated concentration of sulfate (855 mg/L) but the chloride concentration was relatively low at 22.2 mg/L. The high sulfate and low chloride concentrations in PP-AL

contrast sharply with high sodium and chloride concentrations that were historically present in the PW-series wells. In addition, Sr-90 was detected at 4.25 pCi/L. Tritium and Tc-99 were below detection limits in PP-AL, but both were detected in PP-SP at concentrations of 525 and 9.09 pCi/L, respectively.

2.2 Water-Level Measurements

Water-level measurements were taken manually and/or taken automatically with InSitu, Inc. mini-troll data loggers from August 2002 until August 2003 for select perched wells in the INTEC area to monitor the drain-out of perched water following relocation of the percolation ponds, and to aid in the identification of other perched water sources.

2.2.1 Automated Water-Level Monitoring Results and Water Temperature Data

Water-level data were collected by InSitu, Inc. mini-troll instrumentation in several perched water wells. The data for temperature and water-level measurements were taken every half hour at each location. Some problems were encountered with the instrumentation and resulted in data gaps.

The mini-trolls in PW-1, PW-2, PW-3, PW-4, PW-5, PP-CH2, PP-DP-1, and PP-DP4 were used to monitor the drain-out of the perched water beneath the former percolation ponds following the diversion of flow to the new percolation ponds in August 2002. Water levels decreased within days in PW-1, PW-5, and PW-3 following the rerouting of flow to the new percolation ponds. Water levels in PW-4 initially decreased sharply but then decreased more modestly and took several months for the well to drain out. Because the mini-troll in PW-5 was set only about 16 ft below the water level, the water level rapidly leveled out at the mini-troll depth following the diversion of flow from the percolation ponds. Water levels in PP-DP4 oscillated in a 1-ft interval over the monitoring period. Water levels in PP-CH declined from August 2002 until February 2003, but then rose sharply by over 3 ft before resuming a gradual downward drift. The cause of the water level rise in PP-CH in February 2003 is unknown.

Water levels in the upper shallow wells in the northern part of INTEC around the tank farm displayed several patterns or trends. Wells MW-2 and 55-06 showed a nearly identical pattern in water levels. Both wells showed about a 3.5 to 4 increase in the fall 2002 followed by a leveling out from approximately February to June then a decline from June to August. The common water-level pattern for both wells suggests that the wells have the same source of water. In MW-6, water levels rose sharply in the fall, but, instead of declining at the beginning of June 2003, continued a steady rise. In contrast, water levels in 37-4 declined steadily from August 2002 until about March 2003 then rose slightly and leveled out for approximately 2 months before resuming the downward trend. Water levels and temperature readings in MW-5 generally exhibited an inverse relation with a rise in water levels corresponding to a decrease in temperature and a decrease in water levels corresponding to a rise in temperature. Wells MW-2 and MW-5 had the highest perched water temperatures of approximately 20.6 and 19.5°C, respectively, while the other perched wells had temperatures of 11 to 17°C. Water-level trends for the MW-2 and MW-5 wells are different, suggesting different water sources for each well.

In the lower shallow perched water near the tank farm, water levels in MW-20-2 and MW-10-2 show a relatively steady water level over the period from August 2002 to August 2003.

In the deep perched wells, well BLR-DP exhibited a steady decline in water level. In contrast, water levels in MW-1-4 oscillated, but generally ended the approximately 1-year period at about the same level that the period started.

2.2.2 Manual Water-Level Measurements

Manual water-level measurements taken from November 2002 until July 2003 are tabulated in Table B-7 (Appendix B). Water-level measurements from 2001 to the present are shown on the figures in Appendix C (see Figures C-1 and C-2).

In the southern part of INTEC, the manual water-level measurements in the PW-series wells and PP-CH generally support the data generated by the mini-trolls. The manual measurements show a sharp decrease in water levels in the wells near the former percolation ponds after the diversion of flow to the new percolation ponds in August 2002. Water levels at MW-7-2 were fairly constant and were near the bottom of the well. Water levels in MW-17-2 over the last year also indicated that there were usually only a few feet of water in the well, with the highest water level occurring in late May 2003. Because water levels appear unaffected by the diversion of flow to the new percolation ponds, shallow perched wells MW-17-2 and MW-7-2 located north of the former percolation ponds inside the INTEC fence appear to have a different source of water.

Some wells, including 55-06, MW2, and MW-6 in the northern part of INTEC—around the tank farm—generally had the same water-level patterns as the data from the mini-trolls. At 33-2, the difference between the manual measurements, which showed a steady rise, and mini-troll measurements, which showed a sharp decrease around March 2003, may be due to instrument problems. Similarly for MW-5, the difference between the manual measurements and the mini-troll data may be instrument malfunction. The mini-trolls in 33-2 and MW-5 have been replaced with Solinst level-loggers that measure water level, temperature, and specific conductance.

In the deep perched wells, the manual water-level measurements in BLR-DP and MW-1-4 generally support the readings generated by the mini-trolls. Water levels in STL-DP oscillated during the last year but ended the period lower than at the beginning. Water levels in MW-17-4 steadily declined over the past year with the decline probably at least partially due to the diversion of flow from the percolation ponds.

2.3 Moisture Monitoring/Tensiometer Data

According to the MSIP (DOE-ID 2003b), collection of soil moisture data is required to determine whether moisture contents in the vadose zone decrease after relocation of the percolation ponds. As part of the Phase I monitoring discussed in the MSIP, tensiometers were installed in the alluvium, shallow perched water zone, and deep perched zone at each of the five new well sets (BLR, STL, TF, CS, and PP) to determine spatially distributed matric potential for comparison with future data sets. In addition to providing matric potential data for calculating soil moisture contents in the vadose zone, tensiometric data may be used to further clarify sources of groundwater recharge at INTEC and may help to identify dominant flow gradients (that is, vertical or lateral flow) at each of the well sets.

Pressure transducers and data loggers were used to measure and record soil water tension or pressure at each of the installed tensiometers. The tensiometer data presented and discussed in this report were collected between August 2002 and August 2003; but the figures depicting the tensiometer data, include data collected from July 2001 to August 2003, to provide an historical reference of past measurements (Appendix C).

2.3.1 Percolation Pond Set

The tensiometer data are evaluated in relation to the diversion of flow from the former percolation ponds in August 2002. There are six tensiometers associated with the Percolation Pond Set with the depths given in Appendix B, Table B-8, and the data graphed on Figure C-3 (found in Appendix C). The

PP-SP3 tensiometer showed decreasing pressures shortly after the former percolation ponds were taken off-line and flow was diverted to the new percolation ponds. PP-SP3 became unsaturated in March 2003, with pressure leveling off in May 2003. PP-SP1 also showed a trend of decreasing pressure shortly after the percolation ponds were taken off-line. The spike in soil water pressure at PP-SP1 in December 2002 may be due to a calibration problem. The deep tensiometer (PP-DP1) and the alluvial tensiometer (PP-AL) did not show a response to the diversion of flow to the new percolation ponds. PP-SP2 had a malfunction and has not been operational since September 2002.

2.3.2 Central Set

Table **B-8** (found in Appendix B) presents information relating to the installation depths for the six tensiometers in the Central Set (CS). The data are presented in Figure C-4, Appendix C. The data from CS-AL exhibited a slight downward trend, but the data from this tensiometer was deemed questionable due to lack of correlation with the neutron log (DOE-ID 2003c). The tensiometer readings for **CS-DP2** and CS-DP1 remained steady over the monitoring period (August 2002 to August 2003). The tensiometer readings from CS-DP3 remained steady, but the data from this tensiometer was deemed questionable in the MWTS report (DOE-ID 2003c) due to a lack of correlation with the neutron log.

The shallow perched tensiometer, CS-SP1, yielded positive soil water pressure readings during the monitoring period with a sharp spike upward in the May timeframe. The more shallow CS-SP2 showed mostly a decreasing trend in pressure from saturated conditions to unsaturated conditions from August 2002 through May 2003 and then a sharp decrease until August 2003.

2.3.3 Tank Farm Set

Table **B-8** (found in Appendix B) presents information relating to the tensiometer installation depth at the Tank Farm (TF) Set. The data are presented in Figure **C-5** (found in Appendix C). There are large data gaps present in the data because a loose wire connecting the sensors to the data logger caused erroneous readings to be taken from September 5, 2002, to April 9, 2003, when the problem was corrected. In addition, the positive readings in TF-AL over the entire monitoring period are questionable (DOE-ID 2003c). Two of the three tensiometers at this location that were deemed reliable indicate unsaturated conditions over most of the monitoring period. The TF-SP2 tensiometer indicates saturated conditions.

2.3.4 Sewage Treatment Lagoon Set

Table **B-8** (found in Appendix B) presents information relating to the tensiometer installation depth at the Sewage Treatment Lagoon (STL) Set with the data presented on Figure C-6 (found in Appendix C). Pressure readings for STL-SP2 are questionable, based on their steady level, indicating saturated conditions during the entire monitoring period when a piezometer, which was installed 0.3 m (1 ft) above the tensiometer, was always dry when measured.

With the exception of STL-SP1, soil water pressure readings at the sewage treatment lagoons are relatively steady over the entire monitoring period. At STL-SP1, a slight wetting trend was observed to start in February 2003, but started to decline in May 2003. Soil water potentials remained negative throughout the monitoring period in this tensiometer.

2.3.5 Big Lost River Set

The tensiometer data for the Big Lost River (BLR) Set are presented on Figure C-7 (Appendix C), and tensiometer installation depth is listed on Table **B-8**. The steady positive readings recorded in BLR-AL are not likely to represent native moisture conditions, based on neutron log indications of relatively dry material at the tensiometer installation depth (DOE-ID 2003c).

Tensiometer BLR-SP1 showed a gradual increase in soil water pressure from September 2002 to December 2002, then a sharp spike in December 2002 followed by a sharp drop in January 2003. A gradual decrease was observed in BLR-SP1 from February 2003 until June 2003, followed by a steady increase until the end of the monitoring period in August 2003. The tensiometer was completed in basalt overlying silty clay (the assumed perching material) and wets and dries very rapidly. As noted in the MWTS report (DOE-ID 2003c), the rapid wetting and large pressure range may result because the tensiometer was installed in basalt with a very low effective porosity.

A trend toward decreasing head was observed in BLR-SP2, but positive readings were still maintained throughout the monitoring period indicating saturated conditions. A weaker decreasing head was observed for BLR-DPI, but it too managed to have positive pore pressure readings throughout the monitoring period.

3. SUMMARY

The primary radiological contaminants detected in the perched water during 2003 are Sr-90, tritium, I-129, and nitrate. Iodine-129, tritium, and strontium-90 were the radiological analytes detected above their respective MCLs in 2003. Iodine-129 was detected just above its MCL of 1 pCi/L in perched well 33-2. Iodine-129 was only detected in one other well. Strontium-90 was above its MCL of 8 pCi/L in several perched wells near the tank farm in the northern part of INTEC. The highest Sr-90 concentration was 147,000 pCi/L at MW-2. Tritium was detected at 33,800 pCi/L and above its MCL of 20,000 pCi/L in one well, MW-17-2 (33,800 pCi/L), in the southern part of INTEC. The highest Sr-90 concentration was 147,000 pCi/L at MW-2. Tritium was detected at 33,800 pCi/L and above its MCL of 20,000 pCi/L in one well, MW-17-2 (33,800 pCi/L), in the southern part of INTEC. The concentrations of radiological analytes at most well locations showed decreasing concentration trends. Notable exceptions to the decreasing concentration trends were Sr-90 in 55-06 and tritium in MW-17-2.

Nitrate was detected above its MCL of 10 mg/L in several shallow perched water samples near the tank farm and in the deep well MW-1-4 (54.7 mg/L) on the west side of INTEC. Nitrate was also above its MCL in the shallow well, MW-24 (14.5 mg/L-N), near the sewage treatment lagoons. The nitrate concentrations were consistent with historical levels.

Several metals, including chromium, lead, and arsenic, were detected at concentrations above their respective MCLs in unfiltered samples, but were below MCLs in filtered samples indicating that elevated metals are associated with suspended particulates that become dissolved in acidified samples.

Plutonium-238 was detected in one well while plutonium-241 was detected at two other locations. The plutonium detections are suspect because the detections are near the detection limits, and each detection is an isolated occurrence that is not confirmed by the presence of other Pu isotopes. In addition, Pu-isotope detections were well below MCLs. Neptunium-237 was detected only at perched well MW-24, but this was near the detection limit and was not detected in the duplicate sample. Americium-241 was not detected in the perched wells.

Uranium-233/234 and uranium-238 isotopes were detected in all samples, but concentrations are within background limits for total uranium determined by the USGS. Uranium-235/236 was detected in four samples, but all the detected concentrations were similar and near the minimum detectable activity (MDA).

Water-level measurements were taken from perched wells in INTEC to evaluate the extent of perched water bodies and potential recharge sources. The tensiometer and water-level measurements indicate that only the wells in the immediate vicinity of the former percolation ponds are drying up in response to diverted flow to the new percolation ponds. The deep well MW-17-4, located north of the former percolation ponds, appears to also be affected by the diversion of flow. Wells in the northern part of INTEC near the tank farm show some fluctuations but do not appear to be affected by the diversion of water to the new percolation ponds, indicating that other water sources are contributing to the perched water in the northern part of INTEC.

The sources of perched water in the northern part of INTEC will be further investigated in two studies: (1) engineering/water balance study, and (2) a geochemical study. Additional recharge controls include the planned relocation of the sewage treatment lagoons in the Fall of 2003. The geochemical study and water-level monitoring will also be used to evaluate the effect of the relocation of the sewage treatment lagoons.

In-situ temperature readings from the perched wells may indicate that recharge sources are located near MW-2 and MW-5 because these wells have elevated temperatures. Temperature data will be used in combination with the data obtained from the geochemical study and engineering/water balance studies to evaluate perched water sources.

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Appendix A

Analytical Results

Appendix A

Analytical Results

This appendix presents the perched groundwater and lysimeter analytical results. Sampling and analysis of perched groundwater was conducted during February and May of 2003. The complete data set for perched groundwater and lysimeter data is provided as supplemental information on CD but is not part of this controlled document. The data are sorted by constituent in one table and by location in another table. The data qualifier flags used in this appendix are defined as follows:

Inorganic Data Qualifier Flags

B—The result is less than reporting limit required by the contract but is greater than or equal to the instrument detection limit.

E—The post digestion spike was outside control limits.

N—Matrix spike recovery was outside control limits.

U—The analyte was not detected.

R—The accuracy of the data is so questionable that it is recommended that the data not be used. The “R” flag overrides all other applicable flags.

UJ—The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

*—The duplicate analysis was outside the control limits.

Radiological Qualifier Flags

J—The associated value is estimated. The result may not be an accurate representation of the amount of activity actually present in the sample.

R—The accuracy of the data is so questionable that it is recommended that the data not be used. The “R” flag overrides all other applicable flags.

U—The radionuclide is not considered present in the sample (i.e., nondetect).

UJ—The radionuclide may or may not be present, and the result is considered highly questionable. The associated value is an estimate and may be inaccurate or imprecise. The result is considered a nondetect for project data interpretation purposes.

In both tables, sample numbers that end with LL denote a filtered metals sample, and samples that end with LA denote an unfiltered metals sample with one exception. Filtered metals results for MW 17-2 end with LA, and unfiltered data sample numbers end with an LL. For example, sample number PWM31801LL is an unfiltered sample from MW 17-2.

In both tables, the sample and duplicate samples are denoted as PWN32201 and PWN32202. For example, PWN32201UD and PWN32202UD refer to the sample and duplicate for Iodine-129 at MW-24.

The quality control samples are designated in the location field as either field blank or equipment rinsate.

Appendix B

Perched Water Figures and Tables

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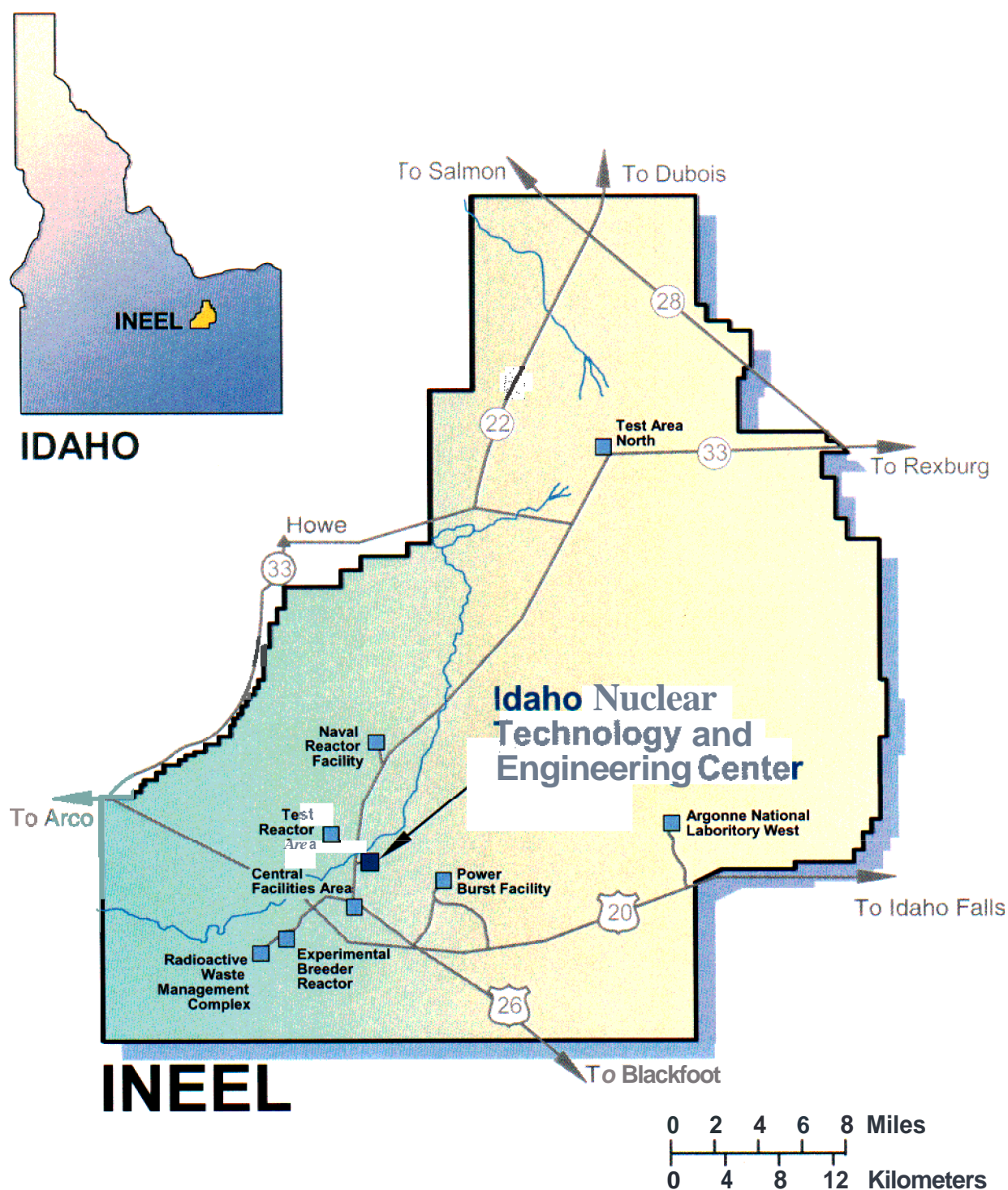


Figure B-1. Map showing location of INTEC at the INEEL.

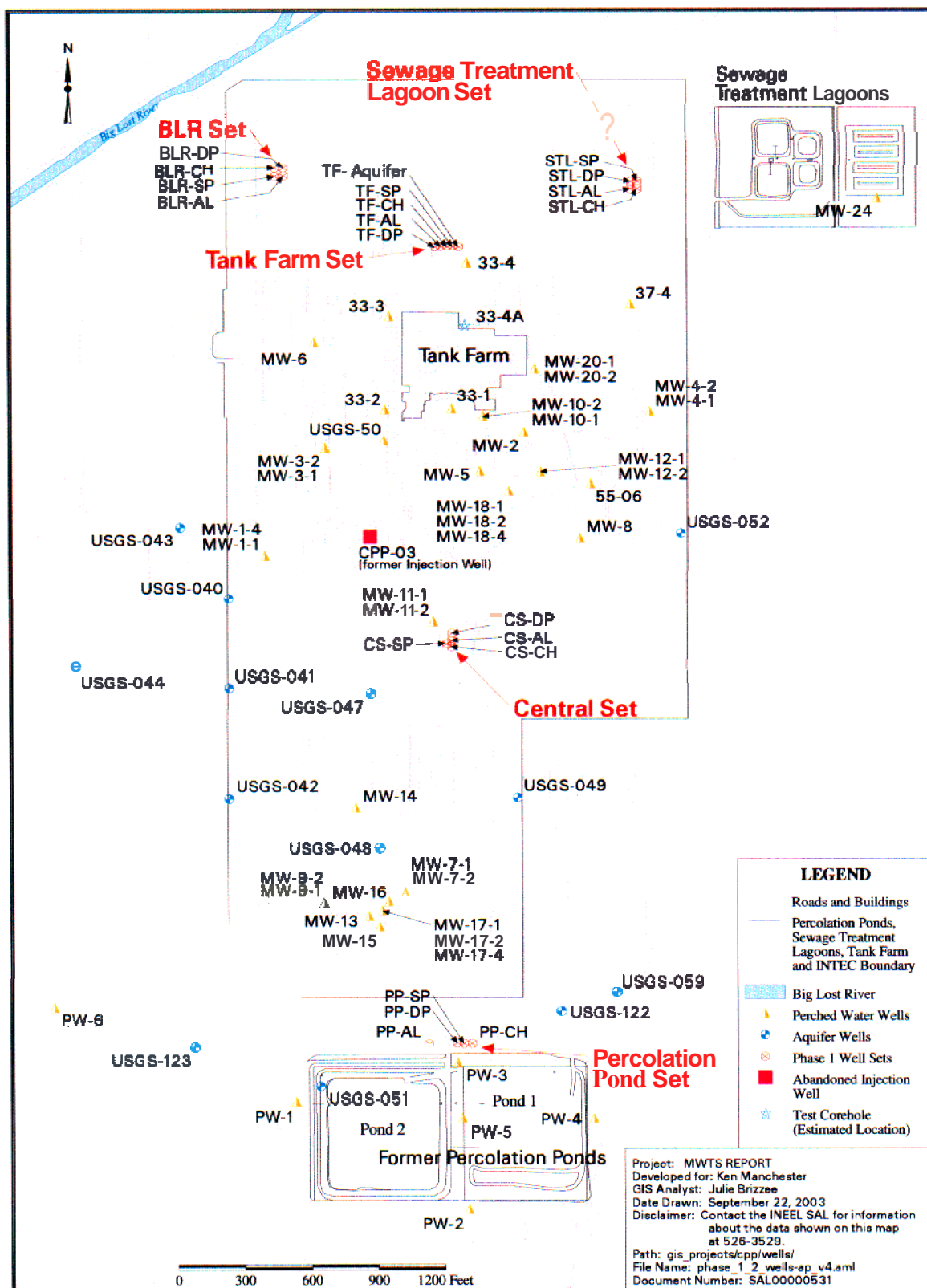


Figure B-2. INTEC site map with well and lysimeter locations.

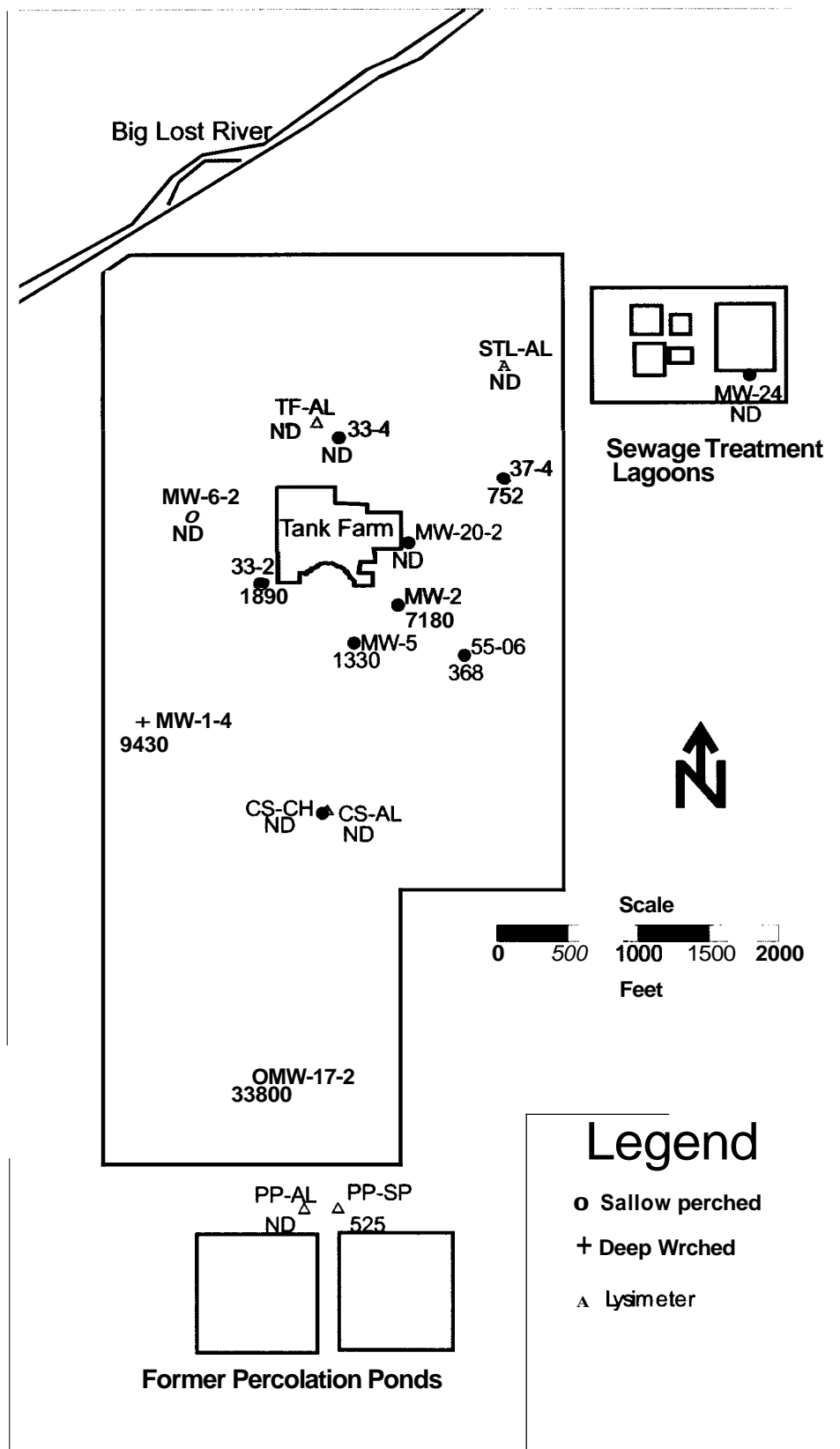


Figure B-3. Distribution of tritium (pCi/L) in perched water in 2003.

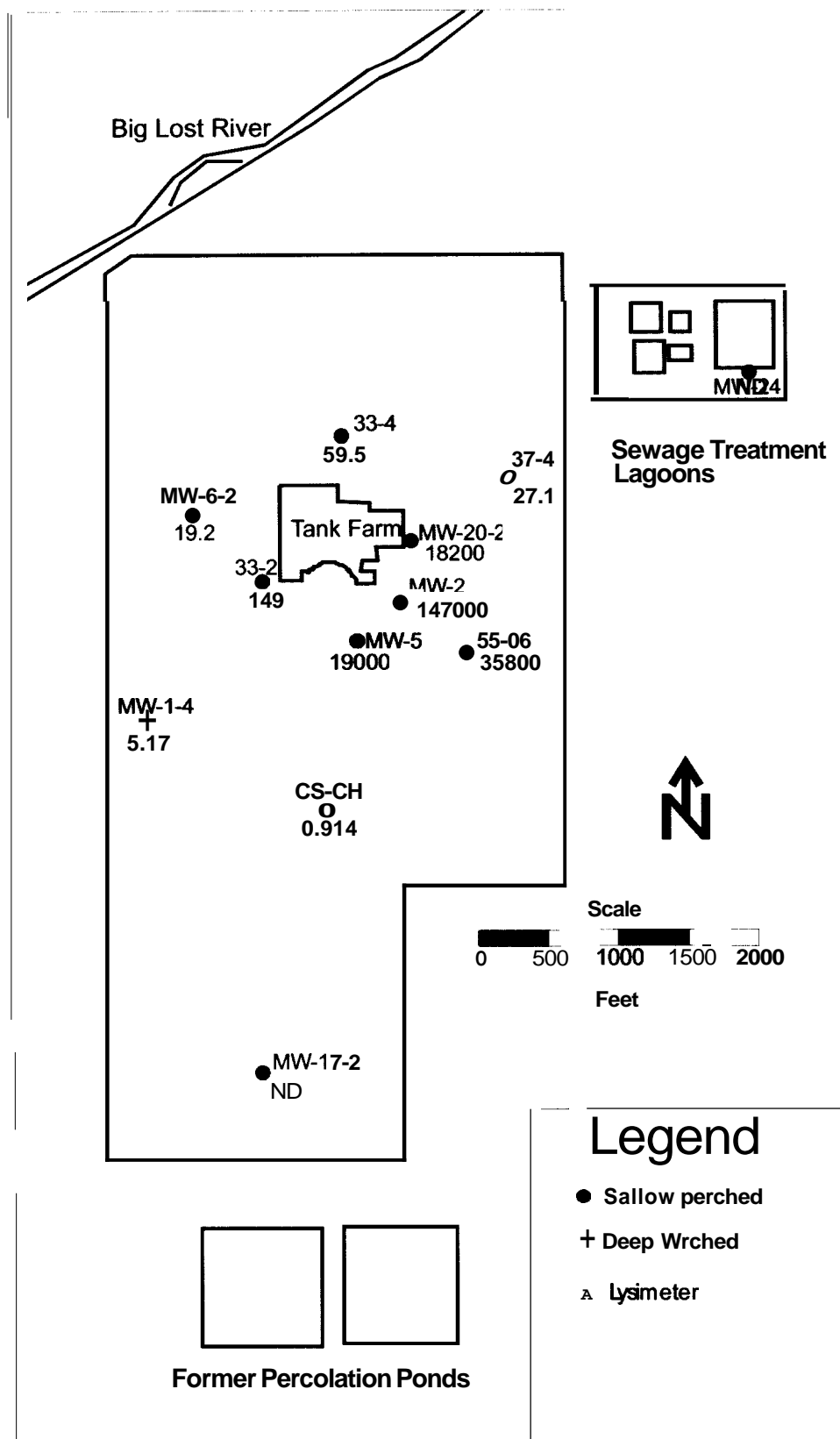


Figure B-4. Distribution of Sr-90 (pCi/L) in perched water in 2003.

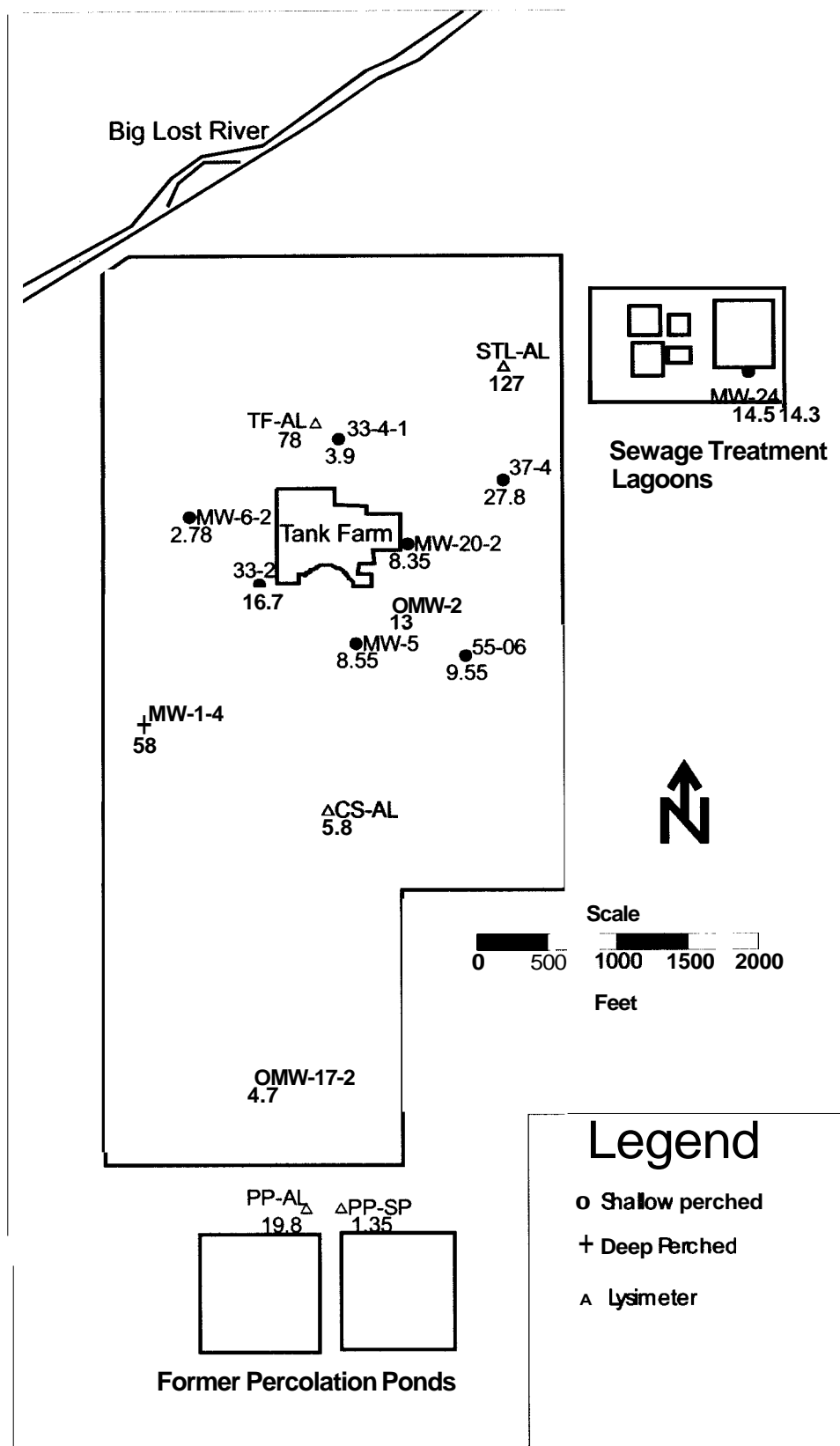


Figure B-5. Distribution of nitrate (mg/L-N) in perched water in 2003.

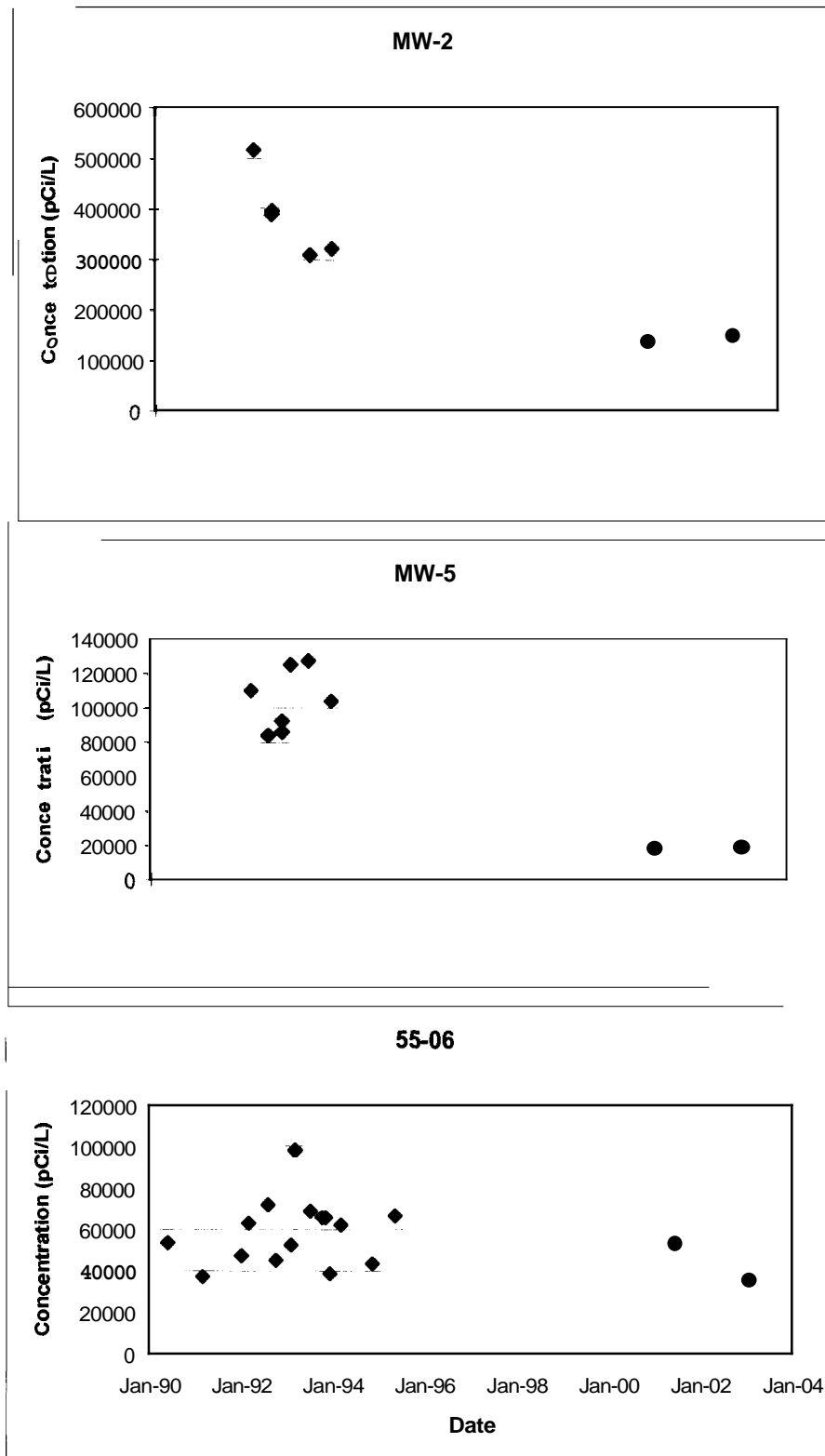


Figure B-6. Sr-90 concentration(pCi/L) trends for select wells in the northern shallow perched water

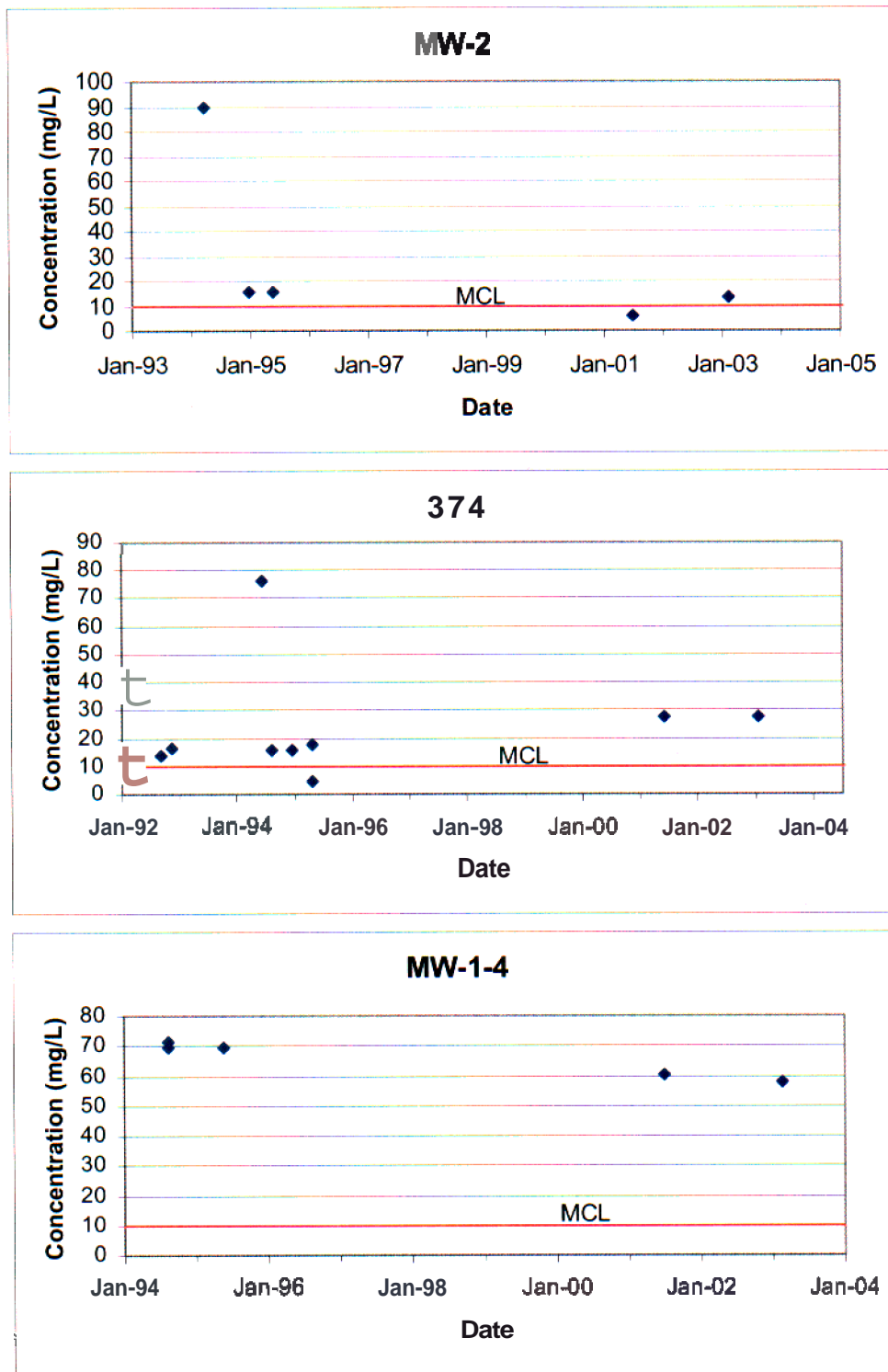


Figure B-7. Nitrate concentration (mg/L-N) trends for select wells.

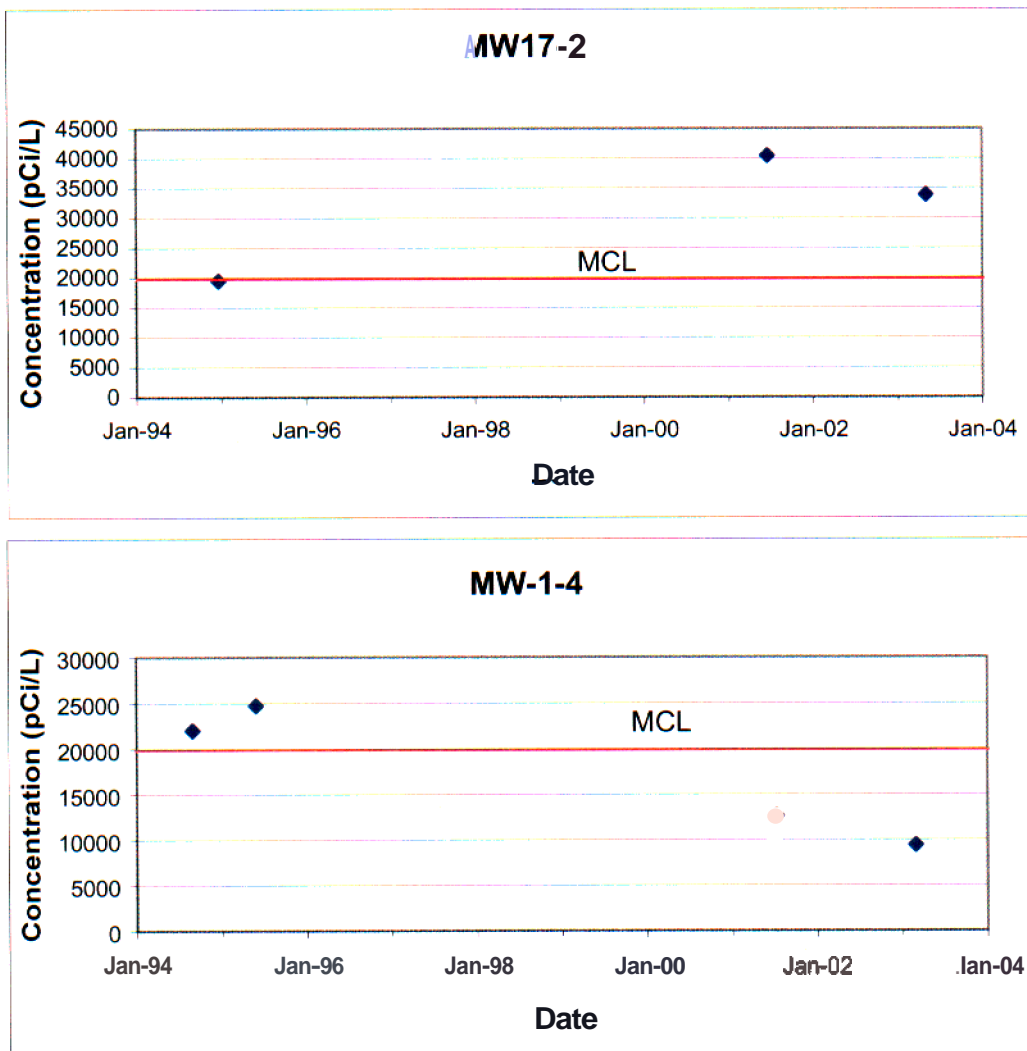


Figure B-8. Tritium concentration(pCi/L) trends for select wells.

Table B-1. Summary of wells sampled and analytes collected for Group 4 2003 perched water sampling (February and May 2003).

Well Name	Depth	Sampling Date	Alkalinity	Am-241	Anions	Gamma Spec	I-129(low)	Nitrate	Np-237	Pu-Iso	Sr.90	Tc-99	Total Metals	Filtered Metals	Tritium	U-Iso
33-1	89-99		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
33-2	86-106	2/12/03	X	X	X	X	4 of 8	X	X	X	X	X	X	X	X	X
33-3	112-122		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
33-4-1	98-118	5/14/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
37-4	100-110	2/12/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
55-06	93-113	2/17/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BLR-Corehole (CH)	120-130		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
BLR-Deep Perched (DP)	375-385		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
CS-CH	188-189	5/14/03	X	Dry	X	Dry	Dry	Dry	X	X	X	X	X	X	X	X
CS-DP-1	368-378		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1-1	359-369		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-1-4	326-336	2/28/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-2	102-112	2/17/03	X	X	X	X	X	X	X	X	X	-c	X	X	X	X
MW-3-1	116-118		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-4-1	128-129.7		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-4-2	101-111		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-5	106-126	2/18/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-6	117-137	2/19/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-7-2	132-142		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-9-2	120-130		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-10-2	141-151		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-15	111-131		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-17-2	182-192	5/14/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-17-4	360-381		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-18-1	394-414		No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge	No recharge
MW-20-2	133-148	2/19/03	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
MW-24	133-148		X	X	X	X	X	X	X	X	X	X	X	X	X	X
MW-24	53-73	3/4/03	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PP-CH-2	235-255		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PP-DP-1 (actually 2 ")	50-55		Dry/Muddy	Dry/Muddy	Drymuddy	Dry/Muddy	Dry/Muddy	Drymuddy	Dry/Muddy	Drymuddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Drymuddy	Dry/Muddy
PP-DP-4	187-192		Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy
PW-1	100-120		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PW-2	111-131		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PW-3	103-123		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PW-4	110-150		Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy	Dry/Muddy
PW-5	109-129		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
STL-DP	429-439		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
USGS-050	356-405		Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke	Pump Broke
<u>Lysimeters</u>																
BLR-AL	32.3	2/24/03	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
STL-AL	26	2/24/2003 ^b	Dry	Dry	X	Dry	Dry	X	Dry	Dry	Dry	X	Dry	X	X	Dry
STL-SP	103.3	2/24/03	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PP-AL	26.6	2/24/2003 ^b	Dry	Dry	X	Dry	Dry	X	Dry	Dry	Dry	X	Dry	Dry	X	Dry
PP-SP	108.81169	2/24/2003 ^b	Dry	Dry	Dry	Dry	Dry	X	Dry	Dry	Dry	X	Dry	Dry	X	Dry
TF-AL	35	2/24/2003 ^b	Dry	Dry	X	Dry	Dry	X	Dry	Dry	Dry	X	Dry	1/2 sample	X	Dry
CS-AL	40.9	2/24/2003 ^b	Dry	Dry	X	Dry	Dry	X	Dry	Dry	Dry	X	Dry	1/2 sample	X	Dry

a. "Dry" means insufficient water available for laboratory analysis.
b. These lysimeters were sampled in February for radiological analytes and on May 21 for metals and anions.
c. The Tc-99 sample was miscoded in the field so the sample was not analyzed for Tc-99.

Table B-2. Summary of key radiological results for perched water in pCi/L.

			Technetium-99			Strontium-90			Tritium			Iodine-129		
Sampling			MCL=900 pCi/L			MCL=8 pCi/L			MCL=20,000 pCi/L			MCL=1 pCi/L		
Location	Date	Depth	Result	+/-		Result	+/-		Result	+/-		Result	+/-	
Perched Wells														
33-2	02/12/03	86-106	-3.92	1.73	U	149 ^a	17.1		1890	114		1.29	0.16	
33-4-1	05/14/03	124	3.18	2.52	U	59.5	7.15		-111	82.2	U	0.077	0.024	UJ
37-4	02/12/03	100-110	-3.21	1.84	U	27.1	3.81		752	98.9		0.031	0.028	U
37-4 dup	02/12/03	100-110	2.39	2.80	U	— ^b	—		—	—		—	—	
55-06	02/17/03	93-113	-1.05	2.34	U	35800	3960		368	84.2		0.000	0.111	u
CS-CH	05/14/03	188-198	-2.80	2.61	U	0.914	0.23		28.0	88.2	U	—	—	
MW-1-4	02/28/03	326-336	-0.78	1.95	U	5.17	0.59		9430	213		0.059	0.035	U
MW-17-2	05/14/03	182-192	-5.50	2.58	U	0.999	0.26		33800	538		0.063	0.044	U
MW-2	02/17/03	102-112	—	—		147000	17300		7180	177		0.000	0.138	U
MW-20-2	02/19/03	133-148	48.7	2.42		18200	2150		212	108	U	0.000	0.323	U
MW-24	03/04/03	53-73	2.82	2.68	U	0.11	0.09	U	-166	98.80	U	0.021	0.023	U
MW-24	03/04/03	53-73	2.54	2.77	U	0.03	0.09	U	27.5	101	u	-0.021	0.020	u
MW-5	02/18/03	106-126	-4.09	1.88	U	19000	2120		1330	102		0.715	0.070	
MW-6-2	02/19/03	117-137	-5.40	2.22	U	19.2	2.43		11.60	73.5	U	0.059	0.032	U
Lysimeters														
CS-AL	02/24/03	40.9	3.58	2.17	U	—	—		67.4	104	U	—	—	
PP-AL	02/24/03	26.6	-0.78	2.24	U	—	—		131	105	U	—	—	
PP-SP	02/24/03	108.8	9.09	2.40		—	—		525	111		—	—	
STL-AL	02/24/03	26	-0.24	2.13	U	—	—		148	104	U	—	—	
TF-AL	02/24/03	35	0.55	2.15	U	—	—		245	105	UJ	—	—	

a. Bold numbers indicate a value greater than the MCL.

b. "—" means not analyzed.

Table B-3. Select metals results in ug/L.^a

Location	Sampling Date	Depth (ft)	Boron			Chromium MCL= 100ug/L				Lead Action level= 15 ug/L				Manganese SMCL=50 ug/L				Arsenic MCL= 10ug/L ^b				Iron SMCL=300 ug/L									
			Filtered	Unfiltered		Filtered	Unfiltered		Filtered	Unfiltered		Filtered	Unfiltered		Filtered	Unfiltered		Filtered	Unfiltered		Filtered	Unfiltered									
Perched Wells																															
33-2	02/12/03	86-106	35.9		58	15.5	*	J	63800^c	*	2.67	U	82.3	52.5		2970	4.1	U*N	UJ	293	*N	J	598	*	J	306000	*	J			
33-4	05/14/03	98-118	32.9		32.4	4.13	B		6.74	B	2.4	U	2.4	U	1.8	B	1.95	B	3.31	U		3.31	U	5.58	U		40.4	B	U		
37-4	02/12/03	100-110	34.9		47.4	9.25	B*	UJ	139	*	2.67	U	35.4	B	1.54	B	609	4.1	U*N	UJ	15.6	B*N	J	22.9	B*	UJ	35400	*	J		
55-06	02/17/03	93-113	78.9		79.7	11.7	*	J	29.7	*	2.67	U	2.67	U	2.65	B	38.1	4.1	U*N	UJ	4.1	U*N	UJ	12.5	B*	UJ	1780	*	J		
CS-CH	05/14/03	188-198	11.1	B	— ^d	1.69	U		—		2.4	U	—		194		—	3.31	U		—		47.4	B	U	—					
MW-1-4	02/28/03	326-336	29.7	B	28.3	5.01	B		30.1		1.86	U	9.78	B	0.559	B	199	1.82	U		6.49	B	8.86	B	U	10800					
MW-17-2	05/14/03	182-192	38.8	E	J	1.69	U		15.5		2.4	U	16.4		12	B	605	5.17	B		8.87	B	88.4	B		39400					
MW-2	02/17/03	102-112	164		169	9.91	B*	UJ	94.3	*	2.67	U	2.67	U	1.5	B	94.5	4.1	U*N	UJ	4.25	B*N	J	25.7	B*	UJ	5480	*	J		
MW-20-2	02/19/03	133-148	49.7	E	J	6.28	B	U	23.6		2.67	U	2.67	U	5.83	B	169	4.1	U		4.1	U	30	B		8830					
MW-24	03/04/03	53-73	47.7	E		49.4	E	J	1.37	U	1.37	U		U	2.67	U	2.67	U	0.421	U	1.08	BU	13.8	B		11.3	B	4.81	U	14.9	B
MW-24 dup	03/04/03	53-73	48.4	E		48.7	E		1.37	U	1.37	U		U	2.67	U	2.67	U	0.421	U	0.77	BU	14.5	B		8.28	B	4.81	U	11.9	B
MW-5	02/18/03	106-126	130	E	J	126	E	J	6.18	B	U	8.71	B	I	2.67	U	2.67	U	0.421	U	154		4.81	U		154					
MW-6-2	02/19/03	117-137	45.2		43.6	5.55	B*	UJ	12.8	*	2.67	U	2.67	U	0.421	U	16.3	4.1	U*N	UJ	4.1	U*N	UJ	4.81	U*	UJ	491	*	J		
Lysimeters																															
CS-AL	05/21/03	40.9	419		—	1.69	U		—		2.4	U	—		13	B	—	3.31	U		—		50	B	U	—					
STL-AL	05/21/03	26	639		—	1.69	U		—		2.4	U	—		585		—	3.31	U		—		5.58	U		—					
TF-AL	05/21/03	35	300		—	2.6	B		—		2.4	U	—		6.96	B	—	3.31			—		5.58	U		—					
a. Data flags are defined in Appendix A. b. The current MCL for arsenic is 50 ug/L. The new MCL of 10 ug/L takes effect in January 2006. c. Bold numbers indicate a value greater than the MCL, SMCL, or action level. d. "—" means not analyzed.																															

Table B-4. Uranium isotope, neptunium-237, and plutonium isotope data for perched water wells with results in pCi/L.

Location	Sampling Date	Depth	Uranium-233/234		Uranium-235			Uranium-238		Neptunium-237		
			pCi/L	+/-	pCi/L	+/-		pCi/L	+/-	pCi/L	+/-	
33-2	02/12/03	86-106	6.66	0.84	0.54	0.19	J	3.56	0.55	-0.0102	0.0229	U
33-4-1	05/14/03	98-118	1.55	0.20	0.13	0.05	J	0.97	0.15	-0.0139	0.0139	U
37-4	02/12/03	100-110	3.84	0.55	0.40	0.15	J	2.68	0.44	-0.0101	0.0176	U
55-06	02/17/03	93-113	2.43	0.37	-0.01	0.04	U	1.22	0.24	0.0908	0.0412	UJ
CS-CH	05/14/03	188-198	4.50	0.55	0.44	0.14		4.85	0.58	-0.0168	0.0158	U
MW-1-4	02/28/03	326-336	1.53	0.14	0.06	0.02		0.81	0.08	0.0420	0.0223	U
MW-17-2	05/14/03	182-192	1.47	0.20	0.10	0.05	UJ	1.42	0.20	0.0058	0.0153	U
MW-2	02/17/03	102-112	3.67	0.62	0.13	0.11	U	1.42	0.35	-0.0118	0.0263	U
MW-2 dup	02/17/03	102-112	2.43	0.38	0.35	0.13	J	2.15	0.36	—	—	
MW-20-2	02/19/03	133-148	2.53	0.21	0.16	0.03		1.30	0.12	0.0065	0.0196	U
MW-24	03/04/03	53-73	1.07	0.18	0.06	0.03	U	0.41	0.10	0.6980	0.1170	J
MW-24 dup	03/04/03	53-73	1.06	0.19	0.08	0.05	U	0.41	0.11	-0.0242	0.0514	U
MW-5	02/18/03	106-126	1.95	0.36	0.03	0.05	U	1.13	0.26	-0.0381	0.0302	U
MW-6-2	02/19/03	117-137	2.37	0.25	0.10	0.04	UJ	0.96	0.13	0.0119	0.0266	U

Location	Sampling Date	Depth	Plutonium-238			Plutonium-239/240			Plutonium-241			Americium-241		
			pCi/L	+/-		pCi/L	+/-		pCi/L	+/-		pCi/L	+/-	
33-2	02/12/03	86-106	-0.0023	0.0023	U	-0.0090	0.0045	U	3.97	2.59	U	0.0507	0.0295	U
33-4-1	05/14/03	98-118	-0.0417	0.0338	U	0.0365	0.0173	UJ	16.5	2.29		0.0320	0.0262	U
37-4	02/12/03	100-110	0.0010	0.0045	U	0.0021	0.0064	U	3.74	2.57	U	-0.0080	0.0057	U
55-06	02/17/03	93-113	0.0365	0.0129	J	0.0083	0.0105	U	3.45	2.69	U	-0.0035	0.0035	U
CS-CH	05/14/03	188-198	0.0127	0.0221	U	0.0127	0.0285	U	-21.8	4.05	UJ	—	—	
MW-1-4	02/28/03	326-336	0.0270	0.0118	UJ	0.0135	0.0083	U	-9.82	2.75	U	0.0114	0.0100	U
MW-17-2	05/14/03	182-192	-0.0324	0.0432	U	-0.0162	0.0235	U	9.54	2.28		0.0403	0.0286	U
MW-2	02/17/03	102-112	0.0231	0.0102	UJ	-0.0001	0.0108	U	1.83	2.60	U	0.0643	0.0347	U
MW-2 dup	02/17/03	102-112	—	—		—	—		—	—		—	—	
MW-20-2	02/19/03	133-148	0.0245	0.0401	U	0.0000	0.0230	U	-3.14	2.87	U	0.0145	0.0126	U
MW-24	03/04/03	53-73	0.0000	1.0000	U	-0.0045	0.0077	U	4.15	2.13	U	0.0358	0.0156	UJ
MW-24 dup	03/04/03	53-73	0.0000	1.0000	U	-0.0041	0.0041	U	2.27	2.03	U	0.0083	0.0059	U
MW-5	02/18/03	106-126	0.0081	0.0058	U	-0.0041	0.0070	U	-4.15	2.97	U	0.0106	0.0079	U
MW-6-2	02/19/03	117-137	0.0000	1.0000	U	-0.0059	0.0080	U	2.82	2.68	U	0.0296	0.0242	U

a. "—" means not analyzed.

Table B-5. Summary of anion results.

Table 2. Summary of data presented.

	Sampling Date	Depth (ft)	Chloride SMCL=250 mg/L	Nitrate/Nitrite MCL=10 mg/L-N ^a	Sulfate SMCL=250 mg/L	
Perched wells						
33-2	02/12/03	86-106	80.7	10.7^b	40.9	
33-4-1	05/14/03	98-118	26	3.9	35.5	J
37-4	02/12/03	100-110	29.2	27.8	66.4	
55-06	02/17/03	93-113	47.2	9.55	27.1	
CS-CH	05/14/03	188-198	31.8	— ^c	18.1	J
MW-1-4	02/28/03	326-336	54.7	58	28.2	
MW-17-2	05/14/03	182-192	21.7	4.7	66.8	J
MW-2	02/17/03	102-112	48.3	13	27.9	
MW-20-2	02/19/03	133-148	27	8.35	38.3	
MW-24	03/04/03	53-73	90.1	14.3	30.1	
MW-24	03/04/03	53-73	90	14.5	30	
MW-5	02/18/03	106-126	30.9	8.55	28.1	
MW-6-2	02/19/03	117-137	45.3	2.78	29	
Lysimeters						
CS-AL	05/21/03	40.9	8.51	15.8	54.6	J
PP-AL	05/21/03	26.6	22.2	19.8	855	J
PP-SP	02/24/03	108.8	—	1.35	—	
STL-AL	05/21/03	26	26.6	127	190	J
TF-AL	05/21/03	35	161	78	569	J

a. Nitrate concentrations are expressed as mg/L-Nitrogen(N).

b. Bold indicates a value above the MCL or SMCL.

c. "—" means not analyzed.

Table B-6. Summary of field measured parameter results.

Well Name	Date	Temperature (C)	pH	Specific Conductivity (mS/cm)
33-2	2/12/03	17.1	7	— ^a
33-3	2/12/03	16.8	7.44	—
37-4-1	2/12/03	9.5	7.93	—
	5/14/03	13.61	7.8	0.515
55-06	2/17/03	10.8	7.73	—
MW-1-4	2/28/03	13.16	7.35	0.951
MW-2	2/17/03	17.7	7.54	—
MW-5	2/18/03	18.6	7.62	—
MW-6-2	2/19/03	16.84	7.13	—
MW-10-2	2/17/03	15.6	7.67	—
MW-17-2	3/5/03	15.37	9.91	0.49
	5/14/03	16.92	9.78	0.478
MW-20	2/19/03	13.9	7.39	0.567
MW-24	3/4/03	9.05	6.55	0.845
PW-1	3/25/03	13.3	7.74	1.012
CS-CH ^b	5/14/03	—	—	—

a. "—" means not measured.

b. Insufficient water to take hydrology laboratory readings.

'able B-7. Summary of m anual water-lev

Well Name	Well Alias																
		13-Nov-02	10-Dec-02	14-Jan43	19-Mar-03	16-Apr-03	8-May-03	10-Jun-03	22-Jul-03	13-Nov-02	10-Dec-02	14-Jan-03	19-Mar-03	16-Apr-03	8-May-03	10-Jun-03	22-Jul-03
CPP-33-2	33-2	98.84	100.61	101.35	100.77	101.66	100	99.79	98.47	4816.56	4814.79	4814.05	4814.63	4813.74	4815.4	4815.61	4816.93
CPP-33-3	33-3	118.21	118.11	118.14	118.03	118.62	118.81	119.17	119.32	4797.99	4798.09	4798.06	4798.17	4797.58	4797.39	4797.03	4796.88
CPP-33-4 (1 in.)	33-4-1	Plugged	Plugged	Plugged	Plugged	Dry	98.61	98.75	98.81	Plugged	Plugged	Plugged	Plugged	Dry	4815.69	4815.55	4815.49
CPP-33-4 (2 in.)	33-4-2	NIA	Dry	Dry	Dry	NIA	Dry	Dry	Dry	NIA	Dry	Dry	Dry	N/A	Dry	Dry	Dry
CPP-37-4	37-4	106.56	106.81	106.89	106.69	106.98	106.69	106.82	107.46	4806.14	4805.89	4805.81	4806.01	4805.72	4806.01	4805.88	4805.24
CPP-55-06	55-06	108.33	107.66	106.53	105.95	106.23	105.98	106.91	108.92	4804.87	4805.54	4806.67	4807.25	4806.97	4807.22	4806.29	4804.28
ICPP-SCI-P-216	BLR-A (alluvial)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-217	BLR-SP	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-218	BLR-DP	383.79	383.79	384.27	384.5	384.74	384.38	384.44	385.09	4532.03	4532.03	4531.55	4531.32	4531.08	4531.44	4531.38	4530.73
ICPP-SCI-P-248	BLR-CH	130.96	130.74	130.89	131.08	131.74	131.77	131.99	132.39	4785.1	4785.32	4785.17	4784.98	4784.32	4784.29	4784.07	4783.67
ICPP-SCI-P-247	CS-A (alluvial)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-225	cs--SP	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-226(1 in.)	CS-DP-1	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-226 (4 in.)	CS-DP-4	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-249 (2 in.)	CS-CH	Plugged	Plugged	Plugged	Plugged	Plugged	190.12	189.46	192.26	Plugged	Plugged	Plugged	Plugged	Plugged	4726.88	4718.54	4724.74
INTEC-MON-P-010(1 in.)	MW-10-1	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-010(2 in.)	MW-10-2	145.93	147.76	147.86	147.99	148.07	147.97	147.78	148.12	4771.47	4769.64	4769.54	4769.41	4769.33	4769.43	4769.62	4769.28
INTEC-MON-P-001 (1 in.)	MW-1-1	NIA	NIA	NIA	Dry	Dry	Dry	Dry	Dry	NIA	NIA	N/A	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-001(4 in.)	MW-1-4	329.95	329.75	330.05	328.94	328.75	327.78	327.88	328.64	4589.35	4589.55	4589.25	4590.36	4590.55	4591.52	4591.42	4590.66
INTEC-MON-P-011 (1 in.)	MW-11-1	116.86	116.73	116.44	Dry	116.7	Dry	Dry	Dry	4802.94	4803.07	4803.36	Dry	4803.10	Dry	Dry	Dry
INTEC-MON-P-011 (2 in.)	MW-11-2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-012 (1 in.)	MW-12-1	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-012 (2 in.)	MW-12-2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-013	MW-13	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-014	MW-14	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-015	MW-15	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-016	MW-16	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-017 (1.25 in.)	MW-17-1.25	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-017 (2 in.)	MW-17-2	189.87	190.41	190.5	190.09	190.15	189.53	189.64	190.77	4731.23	4730.69	4730.6	4731.01	4730.95	4731.57	4731.46	4730.33
INTEC-MON-P-017(4 in.)	MW-17-4	365.41	366.39	366.72	367.16	368.12	368.29	Dry	368.09	4555.69	4554.71	4554.38	4553.94	4552.98	4552.81	Dry	4553.01
INTEC-MON-P-018 (1.25 in.)	MW-18-1.25	Dry	Dry	Dry	Dry	Dry	409.82	409.62	409.77	Dry	Dry	Dry	Dry	Dry	4507.51	4507.71	4507.56
INTEC-MON-P-018(2 in.)	MW-18-2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-002	MW-2	109.72	109.52	107.96	107.14	107.5	107.3	108.01	109.89	4806.38	4806.58	4808.14	4808.96	4808.6	4808.8	4808.09	4806.21
INTEC-MON-P-020 (2 in.)	MW-20-2	140.05	140.17	140.35	Dry	140.25	140.06	139.92	140.36	4776.95	4776.83	4776.65	#N/A	4776.75	4776.94	4777.08	4776.64
ICPP-MON-A-021	MW-21	441.31	443.45	442.01	442.31	442.3	442.45	442.34	443.33	4464.8	4462.66	4464.1	4463.8	4463.81	4463.66	4463.77	4462.78
INTEC-MON-P-024	MW-24	61.62	61.65	61.65	61.6	61.6	62.05	62.2	61.99	4850.48	4850.45	4850.45	4850.5	4850.5	4850.05	4849.9	4850.11
INTEC-MON-P-003(1 in.)	MW-3-1	122.11	122.04	122.06	131.91	122.09	121.92	mud	122.22	4796.39	4796.46	4796.44	4796.59	4796.41	4796.58	mud	4796.28
INTEC-MON-P-003 (2 in.)	MW-3-2	NIA	137.87	137.41	135.77	135.45	136.05	138.26	139.56	#N/A	4780.63	4781.09	4782.73	4783.05	4782.45	4780.24	4778.94
INTEC-MON-P-004(1 in.)	MW-4-1	131.75	131.48	131.54	131.45	131.51	131.32	131.00	131.27	4782.05	4782.32	4782.26	4782.35	4782.29	4782.48	4815.05	4782.53
INTEC-MON-P-004 (2 in.)	MW-4-2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
INTEC-MON-P-005 (2 in.)	MW-5-2	115.63	116.38	114.68	116.24	114.78	115.03	114.35	113.11	4803.47	4802.72	4804.42	4802.86	4804.32	4804.07	4804.75	4805.99
INTEC-MON-P-006 (2 in.)	MW-6	120.84	119.1	119.12	119.32	119.5	119.3	118.86	118.51	4798.46	4800.2	4800.18	4799.98	4799.8	4800	4800.44	4800.79
INTEC-MON-P-007 (1 in.)	MW-7-1	Dry	Dry	Dry	Dry	108.89	108.5	Dry	Dry	Dry	Dry	Dry	Dry	4810.31	4810.7	Dry	Dry
INTEC-MON-P-007(2 in.)	MW-7-2	141.08	141.07	141.13	141.39	141.5	140.71	140.74	141.08	4779.02	4779.03	4778.97	4778.71	4778.60	4779.39	4779.36	4779.02
INTEC-MON-P-008	MW-8	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Table B-7. (continued).

Well Name	Well Alias									Water Level Elevation (ft)							
		13-Nov-02	10-Dec-02	14-Jan43	19-Mar43	16-Apr-03	8-May-03	10-Jun-03	22-Jul-03								
INTEC-MON-P-009 (2 in.)	MW-9-2																
ICPP-SCI-P-222	PP-A (alluvial)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-223	PP-SP	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-224(1 in.)	PP-DP-1	58.26	58.42	58.47	Dry	58.6	58.51	68.65	58.79	4860.46	4860.3	4860.25	#N/A	4860.12	4860.21	4850.07	4859.93
ICPP-SCI-P-224 (4 in.)	PP-DP-4	376.72	376.81	377.21	376.8	Dry	376.84	377.05	377.62	4542	4541.91	4541.51	4541.92	#N/A	4541.88	4541.67	4541.1
ICPP-SCI-P-250 (1 in.)	PP-CH-1	N/A	N/A	N/A	Dry	Dry	Dry	Dry	Dry	N/A	N/A	N/A	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-250 (2 in.)	PP-CH-2	N/A	N/A	N/A	240.73	240.7	240.32	240.27	241.43	#N/A	#N/A	#N/A	4678.33	4678.36	4678.74	4678.79	4677.63
PW-1	PW-I	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PW-2	PW-2	130.27	131.1	Dry	Dry	Dry	Dry	Dry	Dry	4788.27	4787.44	Dry	Dry	Dry	Dry	Dry	Dry
PW-3	PW-3	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PW-4	PW-4	89.06	90.23	94.71	96.86	120.1	120.55	121.02	121.68	4829.24	4828.07	4823.59	4821.44	4798.2	4797.75	4797.28	4796.62
PW-5	PW-5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-219	STL-A (alluvial)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-221	STL-DP	437.77	439.11	439.2	437.18	438.12	437.42	438.44	439.44	4474.33	4472.99	4472.9	4474.92	4473.98	4474.68	4473.66	4472.66
ICPP-SCI-P-251 (1 in.)	STL-CH-I	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-251 (2 in.)	STL-CH-2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-227	TF-A (alluvial)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-228	TF-SP	156.99	159.68	156.48	155.95	156.13	155.86	155.96	156.15	4757.81	4755.12	4758.32	4758.85	4758.67	4758.94	4758.84	4758.65
ICPP-SCI-P-229	TF-DP	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
ICPP-SCI-P-252	TF-CH	147.14	146.26	146.36	145.97	146.21	145.7	145.81	146.33	4767.83	4768.71	4768.61	4769.00	4768.76	4769.27	4769.16	4768.64
USGS-50	USGS-50	Locked	N/A	N/A	382.84	372.8	382.74	381.87	382.89	#N/A	#N/A	#N/A	4534.33	#N/A	4534.43	4535.3	4534.28

Table B-8. Tensiometer depths.

Location	Tensiometer	Installation Depth (ft bgs)
Big Lost River Set	BLR-AL	32.87
	BLR-SP1	132.5
	BLR-SP2	166.75
	BLR-DP1	352
Sewage Treatment Set	STL-AL	26.5
	STL-SP1	103.5
	STL-SP2	146
	STL-DP1	384.5
	STL-DP2	416
Tank Farm Set	TF-AL	35
	TF-SP1	118
	TF-SP2	157
	TF-DP2	388.5
Central Set	cs-AL	41.5
	CS-SP1	122
	cs-SP2	155
	CS-DP1	280
	CS-DP2	287
	CS-DP3	383
Percolation Pond Set	PP-AL	27.38
	PP-SP1	108.8
	PP-SP2	131.5
	PP-SP3	169
	PP-DP1	263.5
	PP-DP2	383

Appendix C

Water-Level Measurement and Tensiometer Data

Mini-trolls

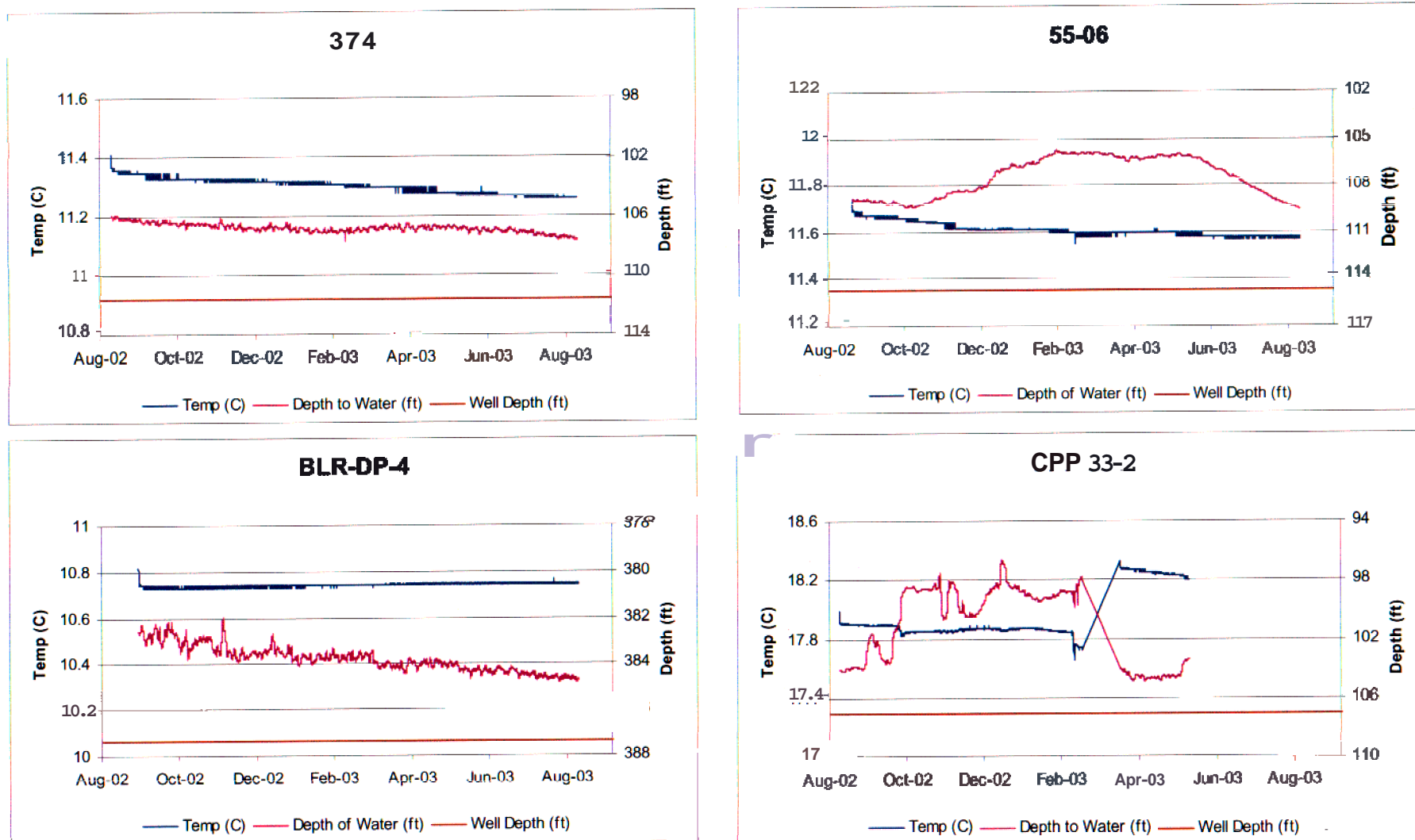


Figure G1. Hydrographs of perched water monitoring wells and temperature measurements.

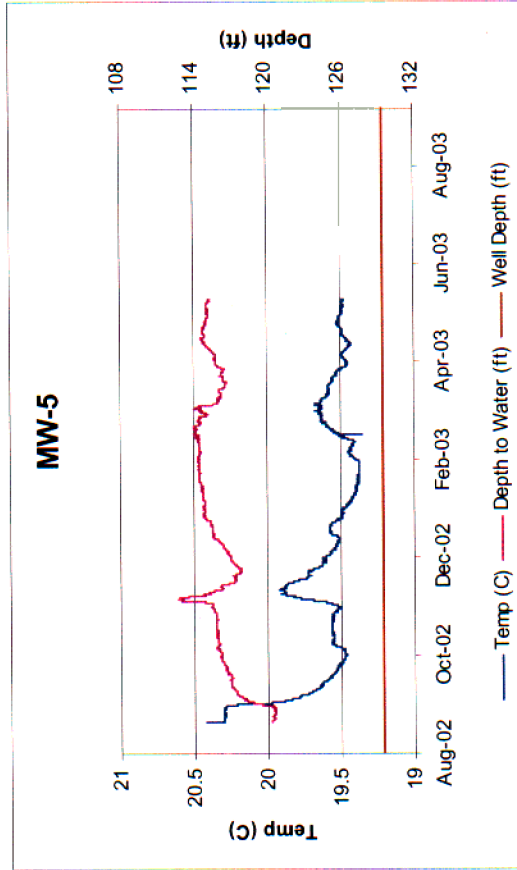
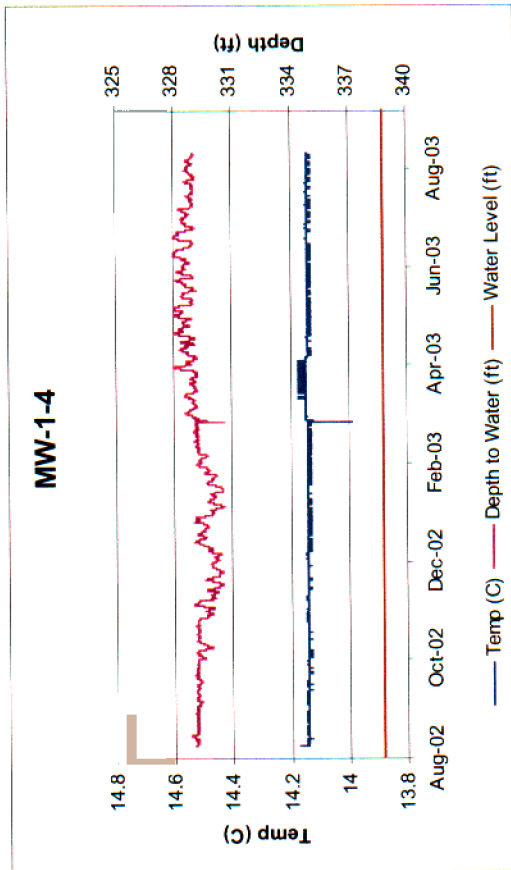
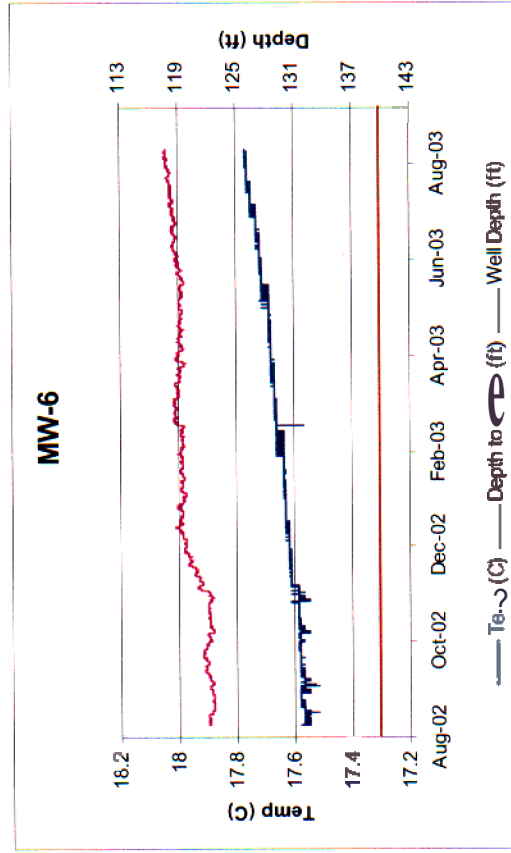
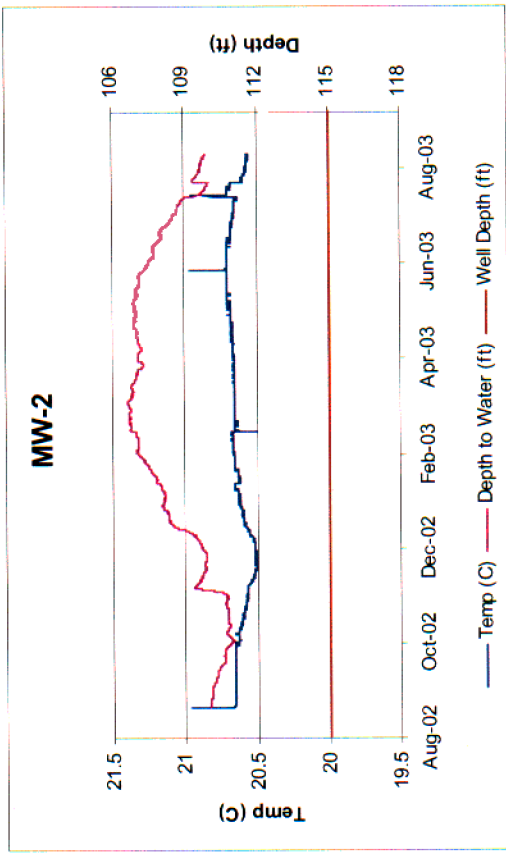


Figure 3. (continued).

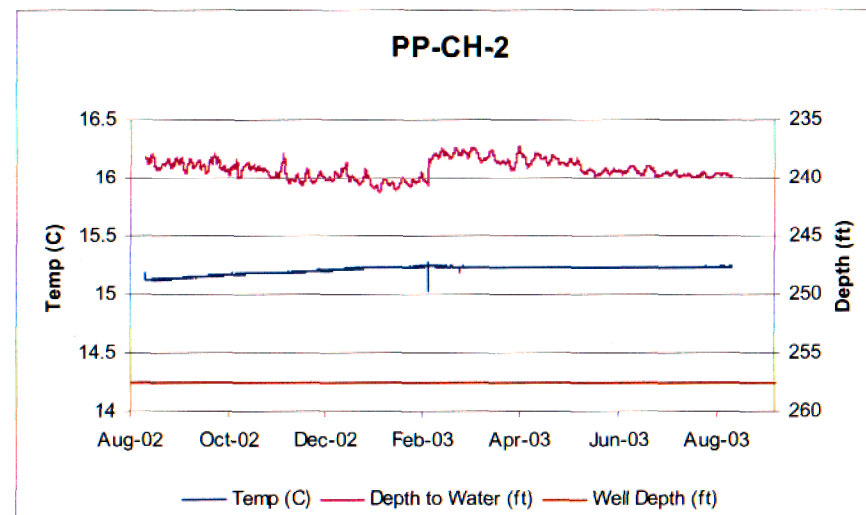
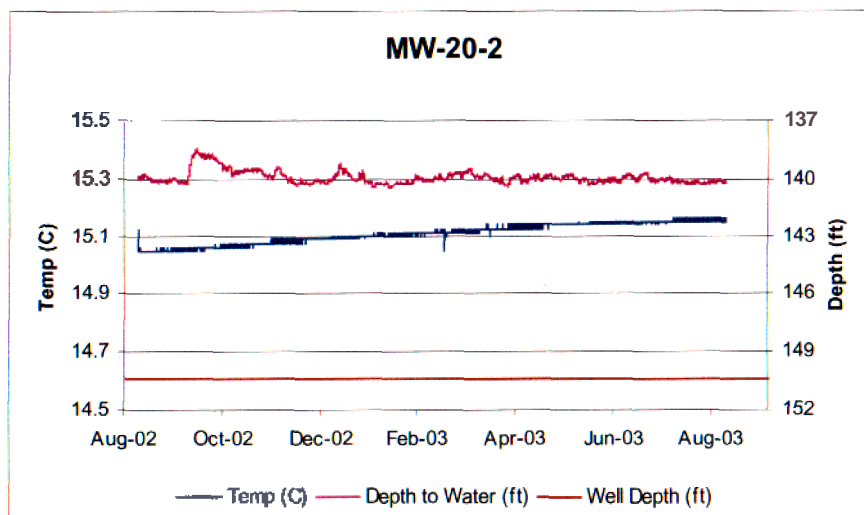
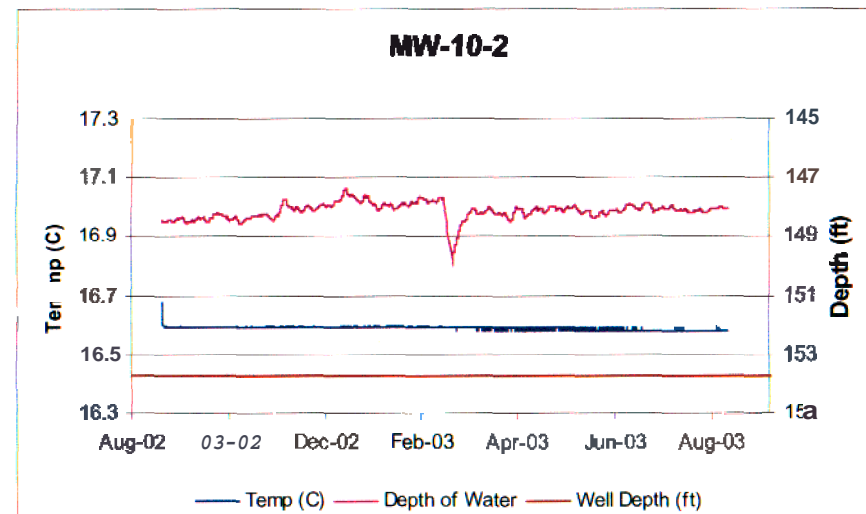
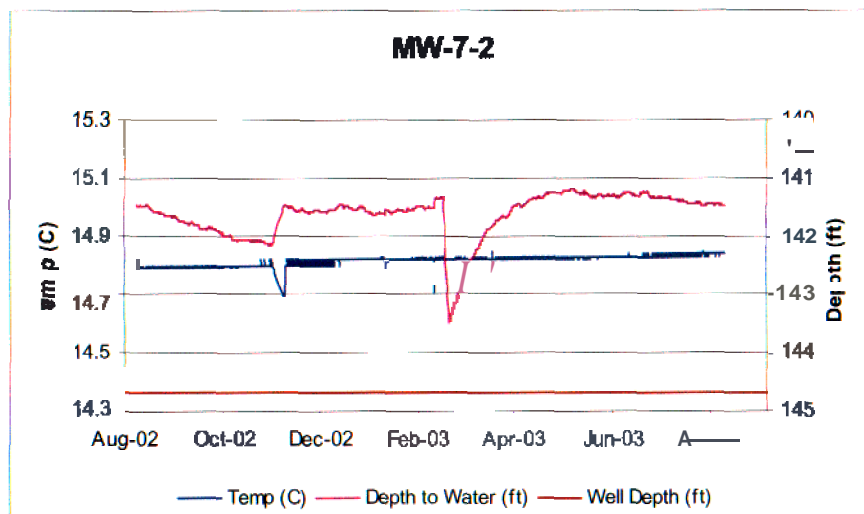


Figure C-1. (continued).

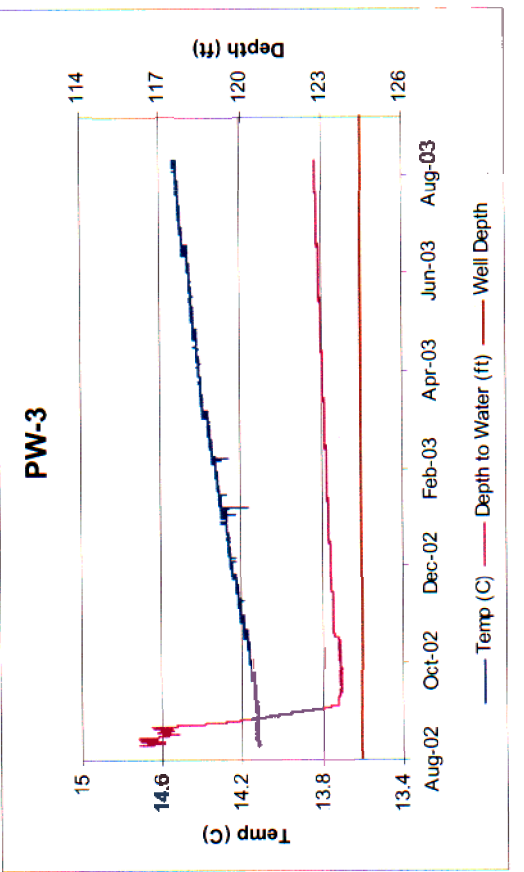
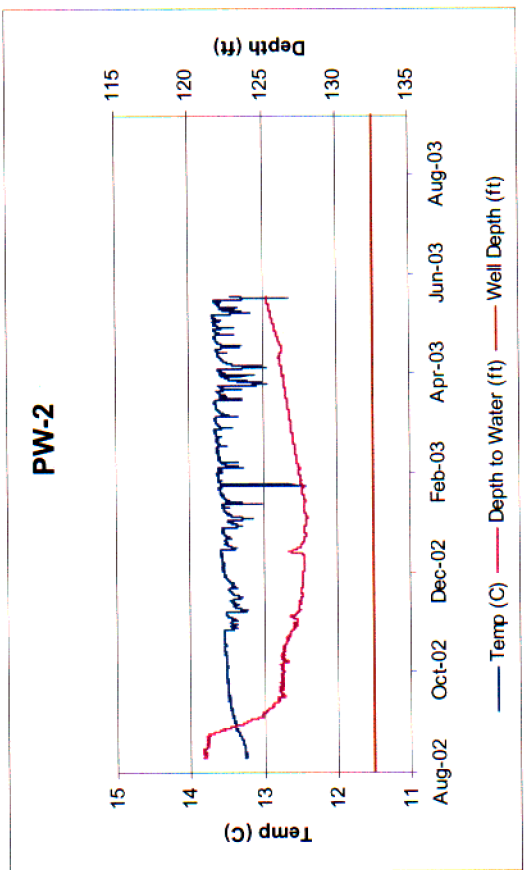
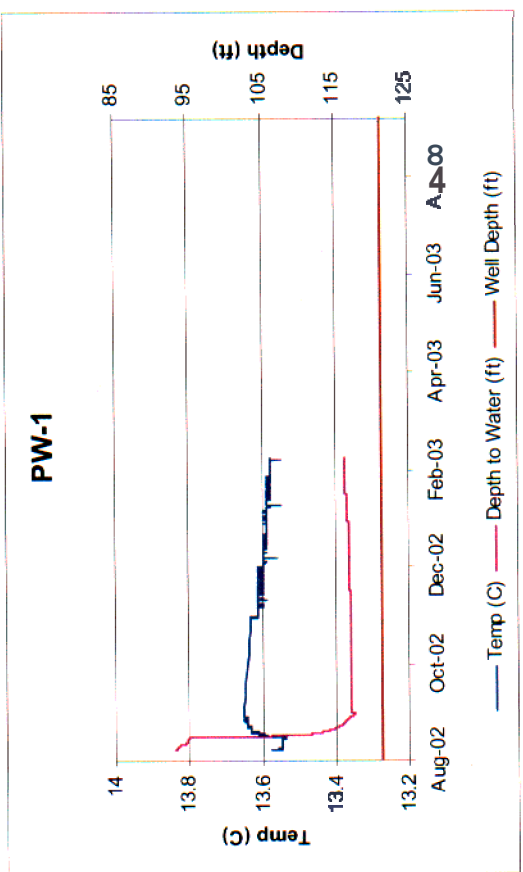
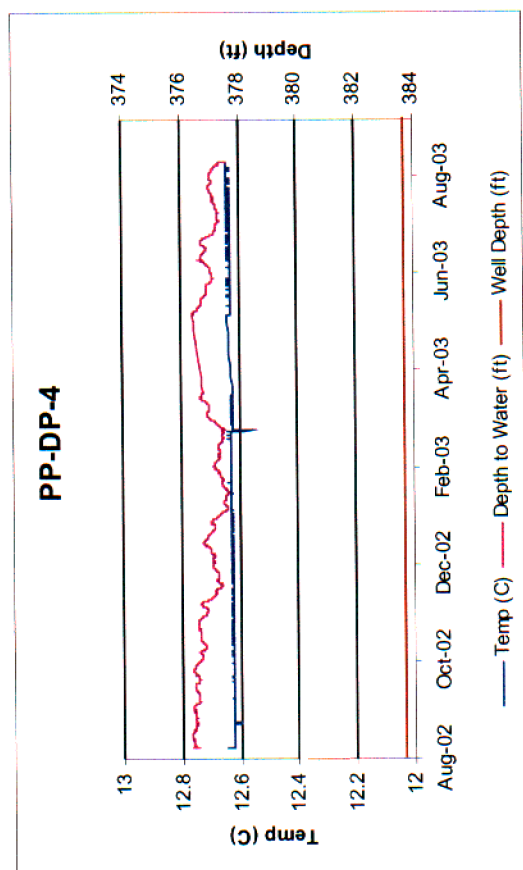


Figure C-11. (continued).

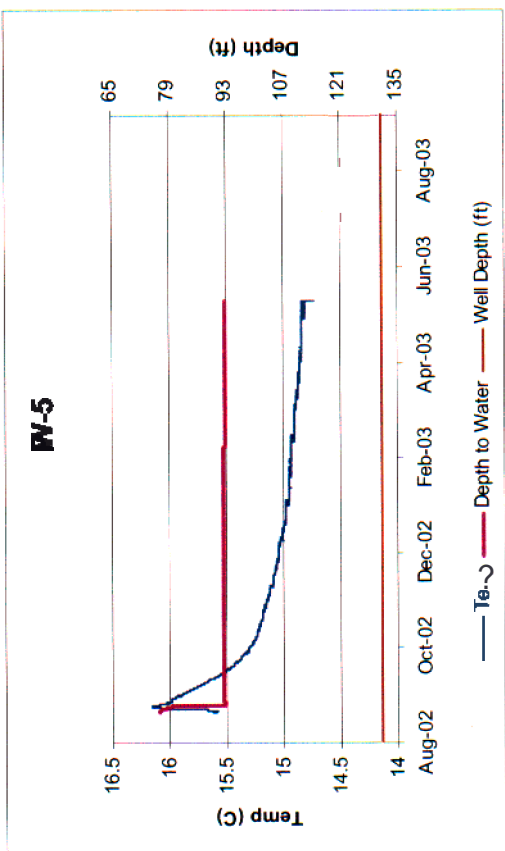
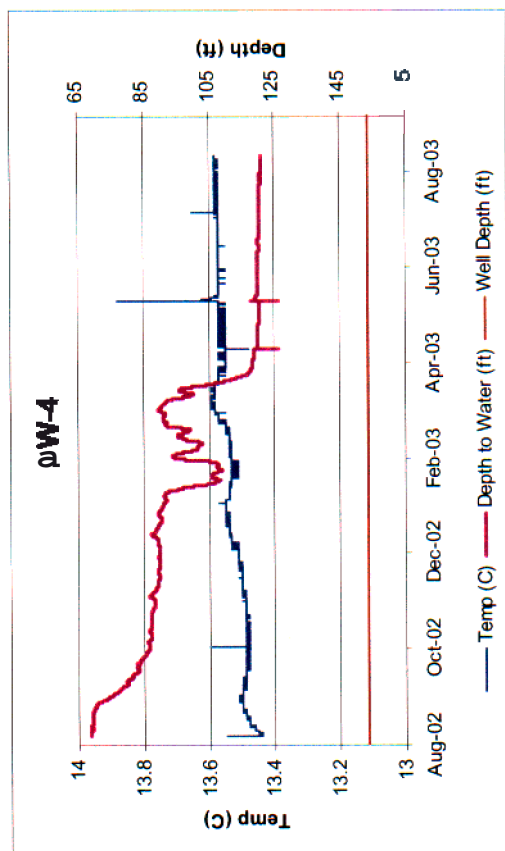


Figure C-1. (continued).

Manual Water Levels

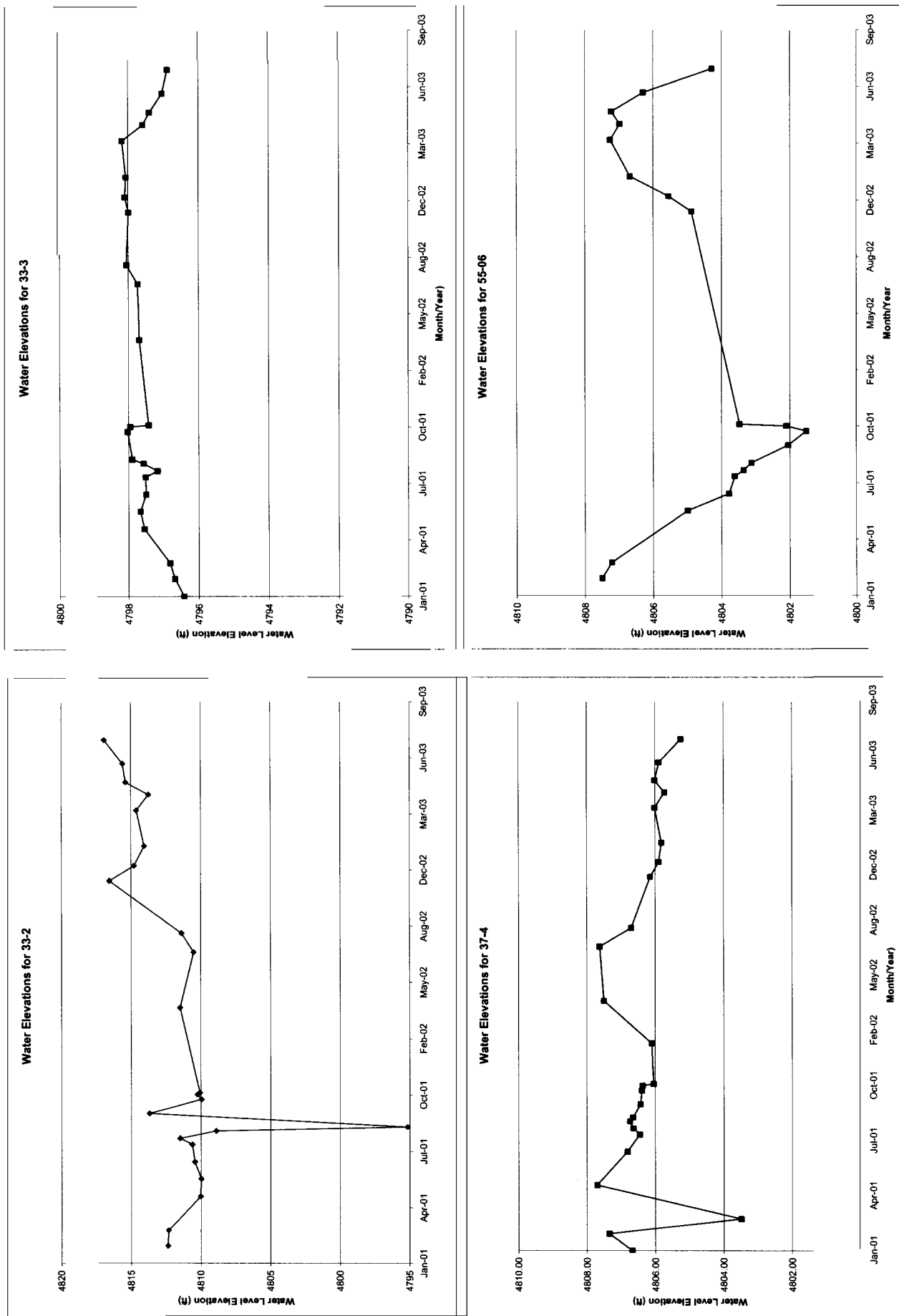


Figure C-2. Hydrographs of manual water-level measurements.

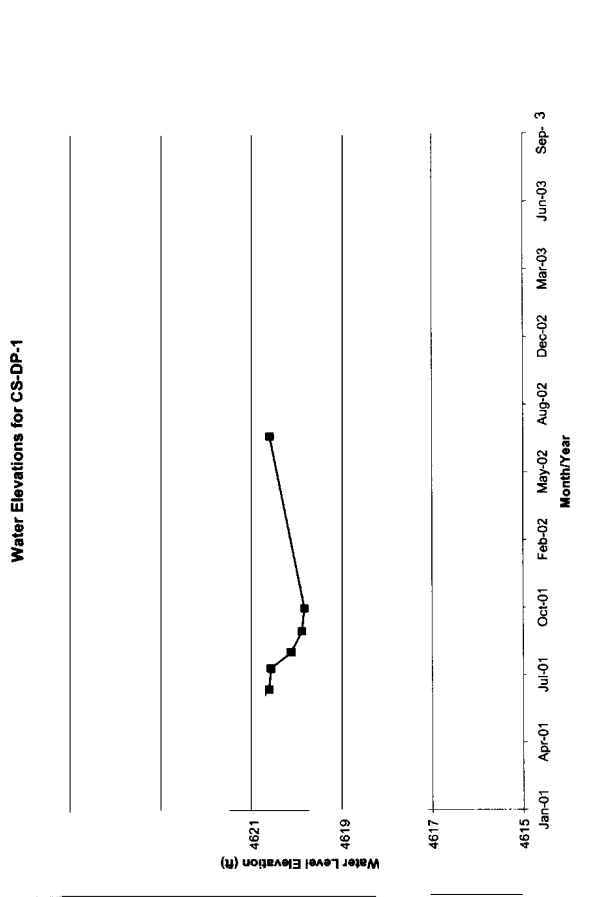
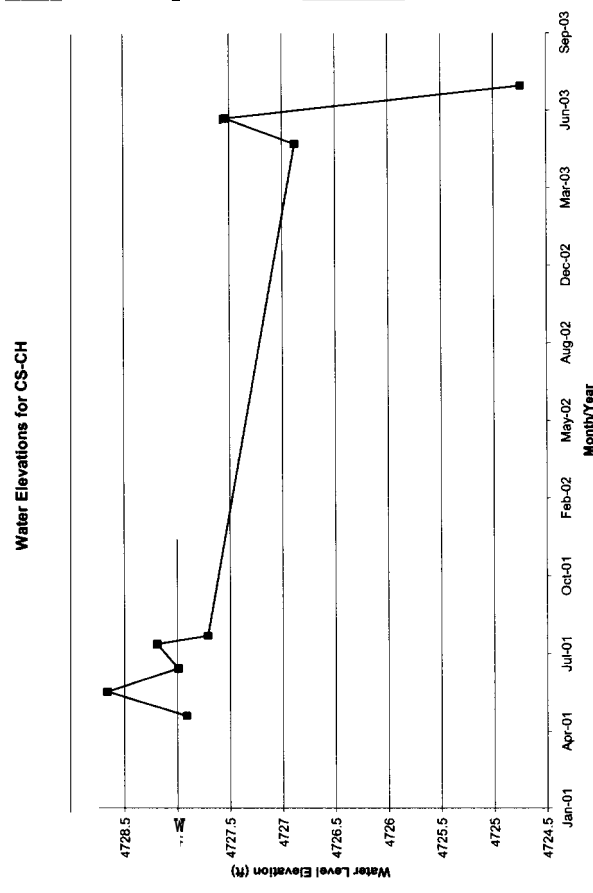
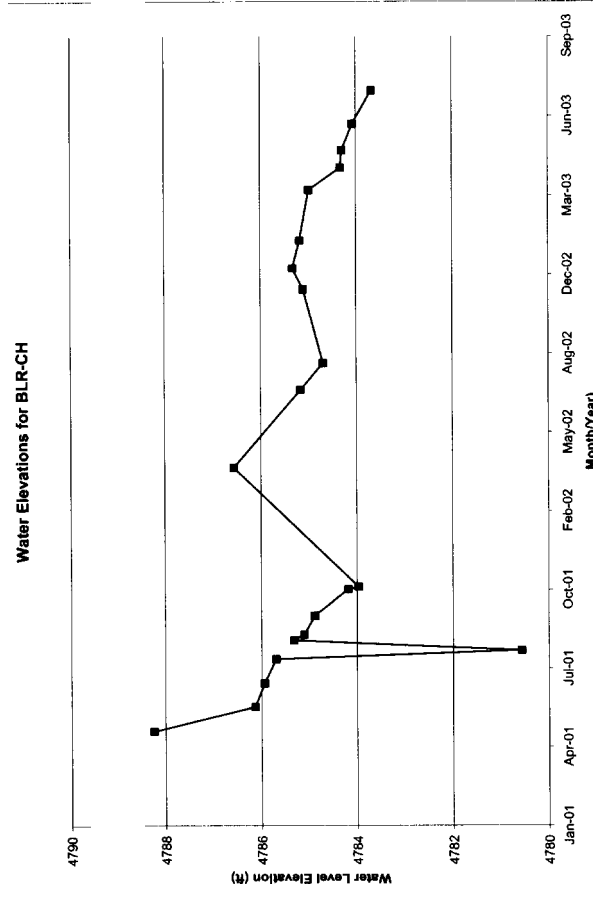
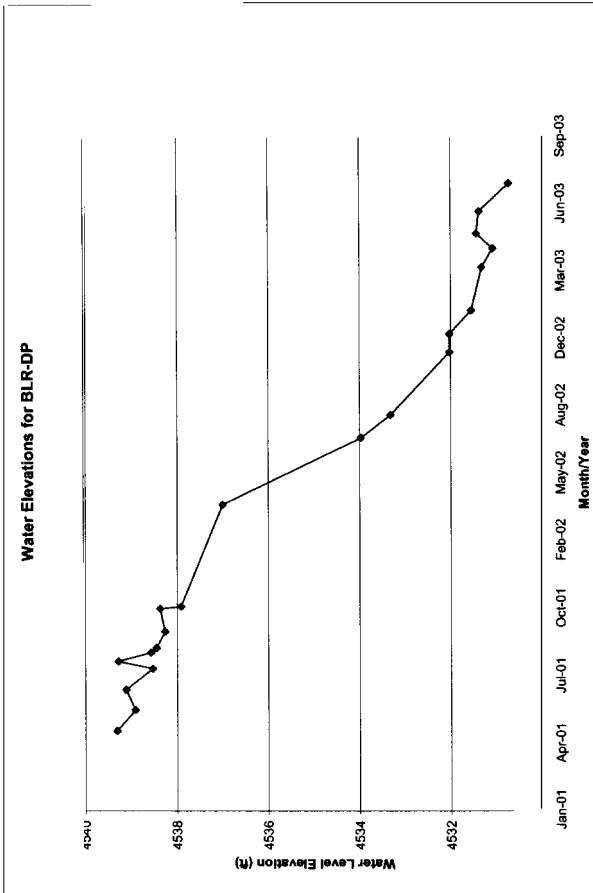


Figure C-2. (continued).

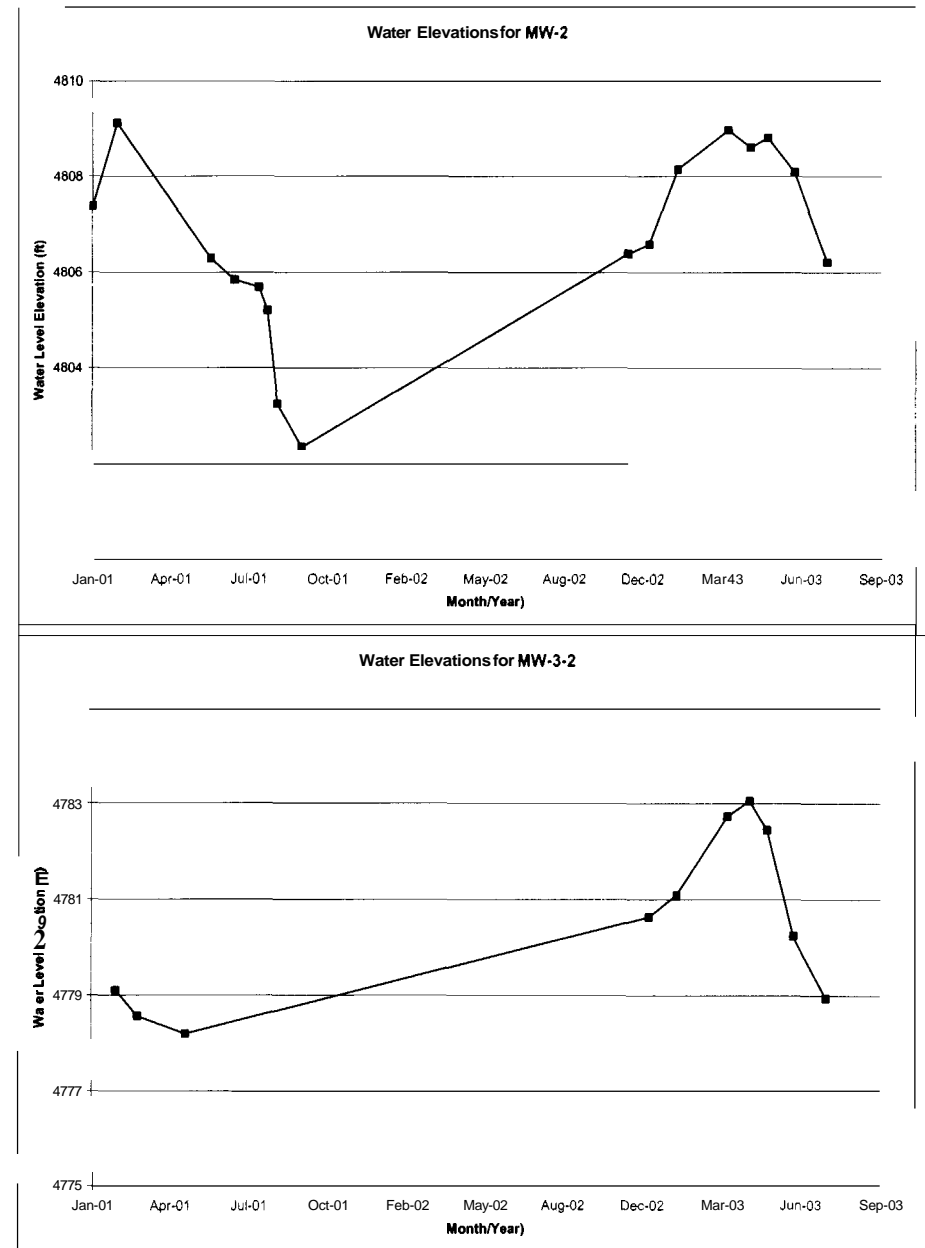
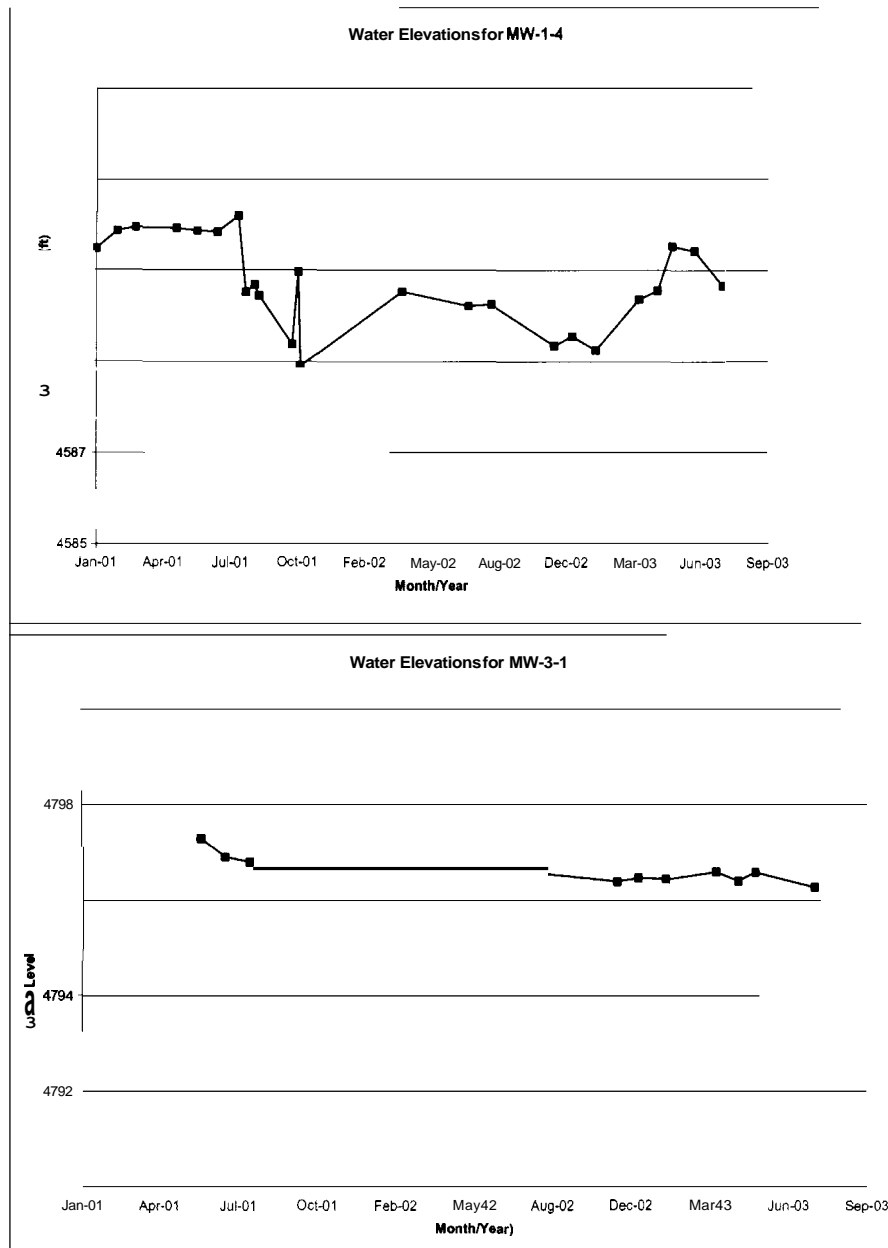


Figure C-2. (continued).

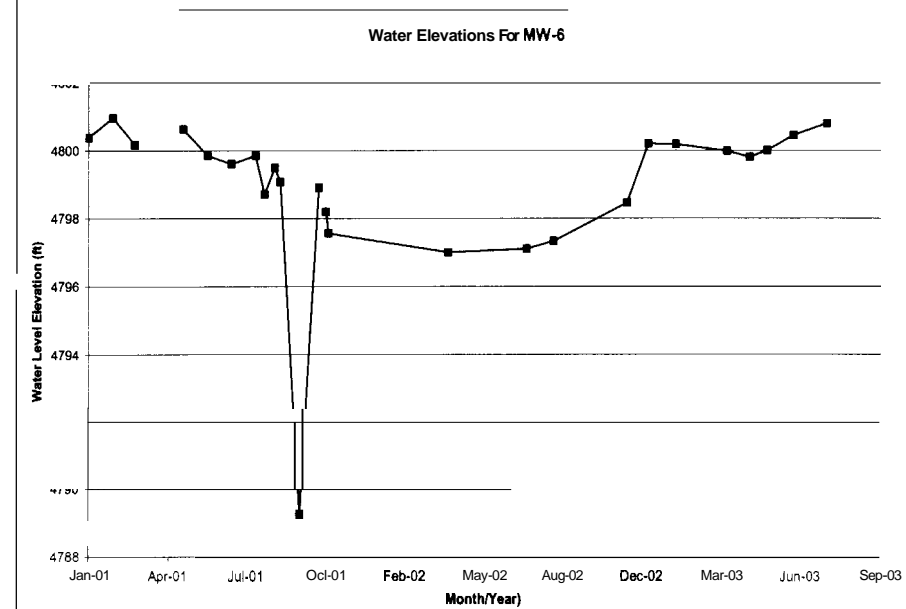
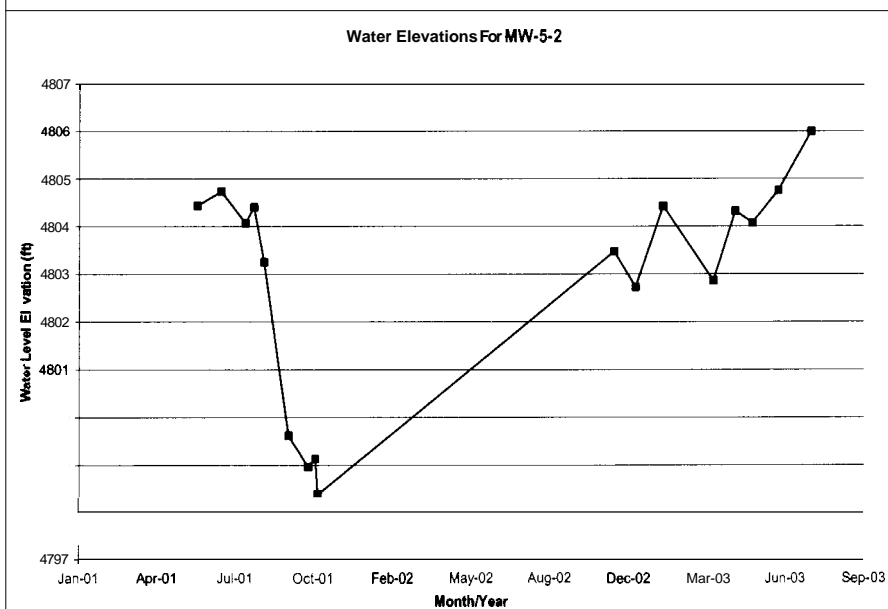
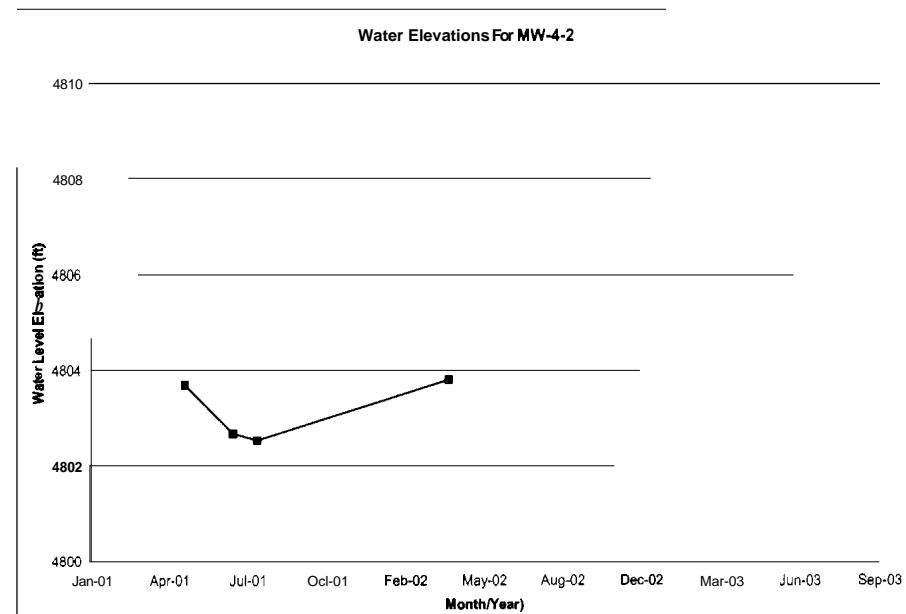
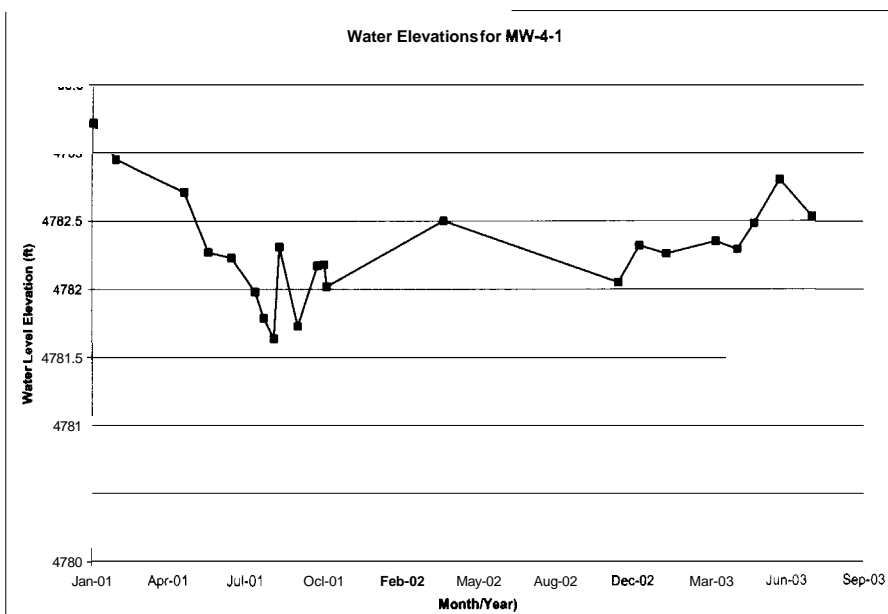


Figure C-2. (continued).

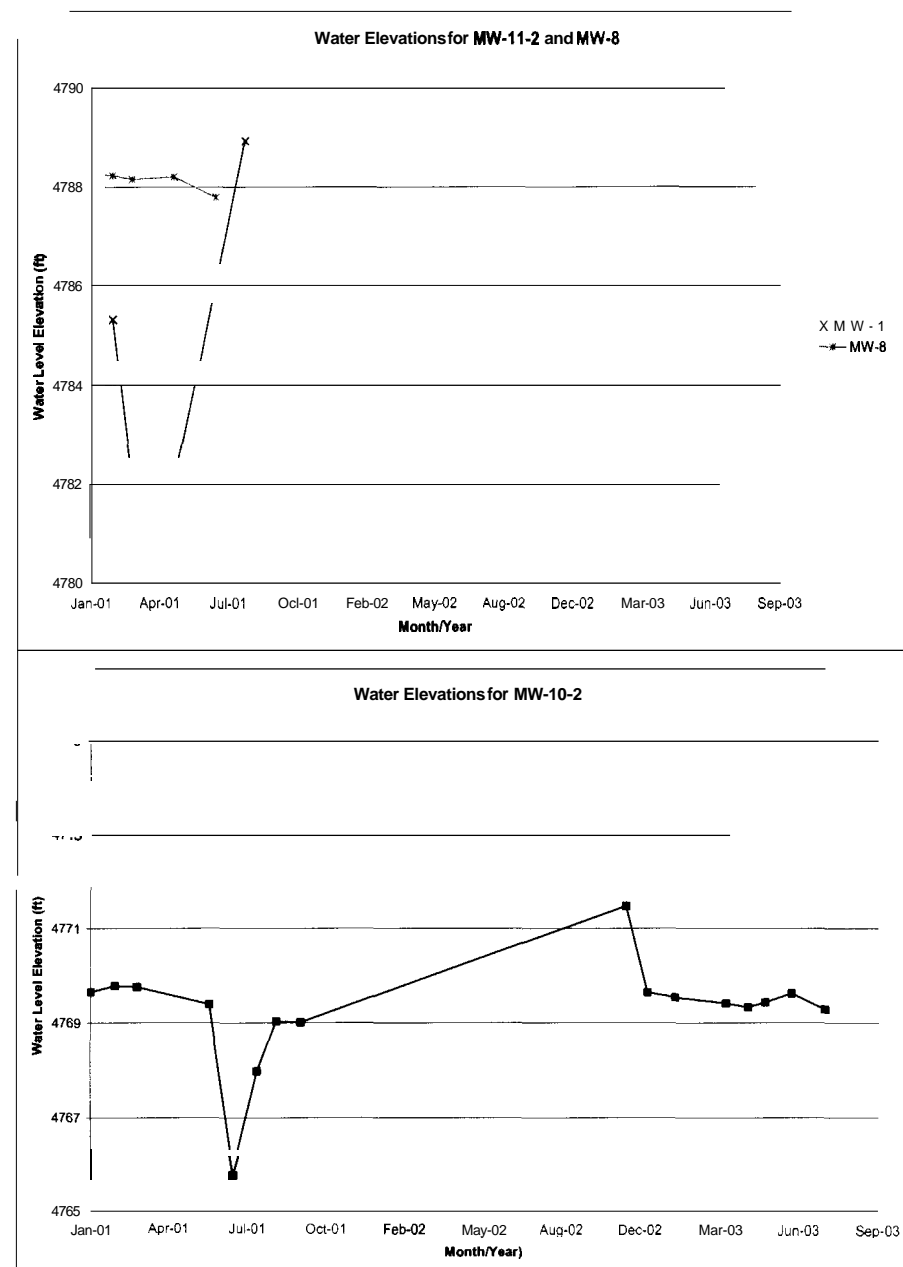
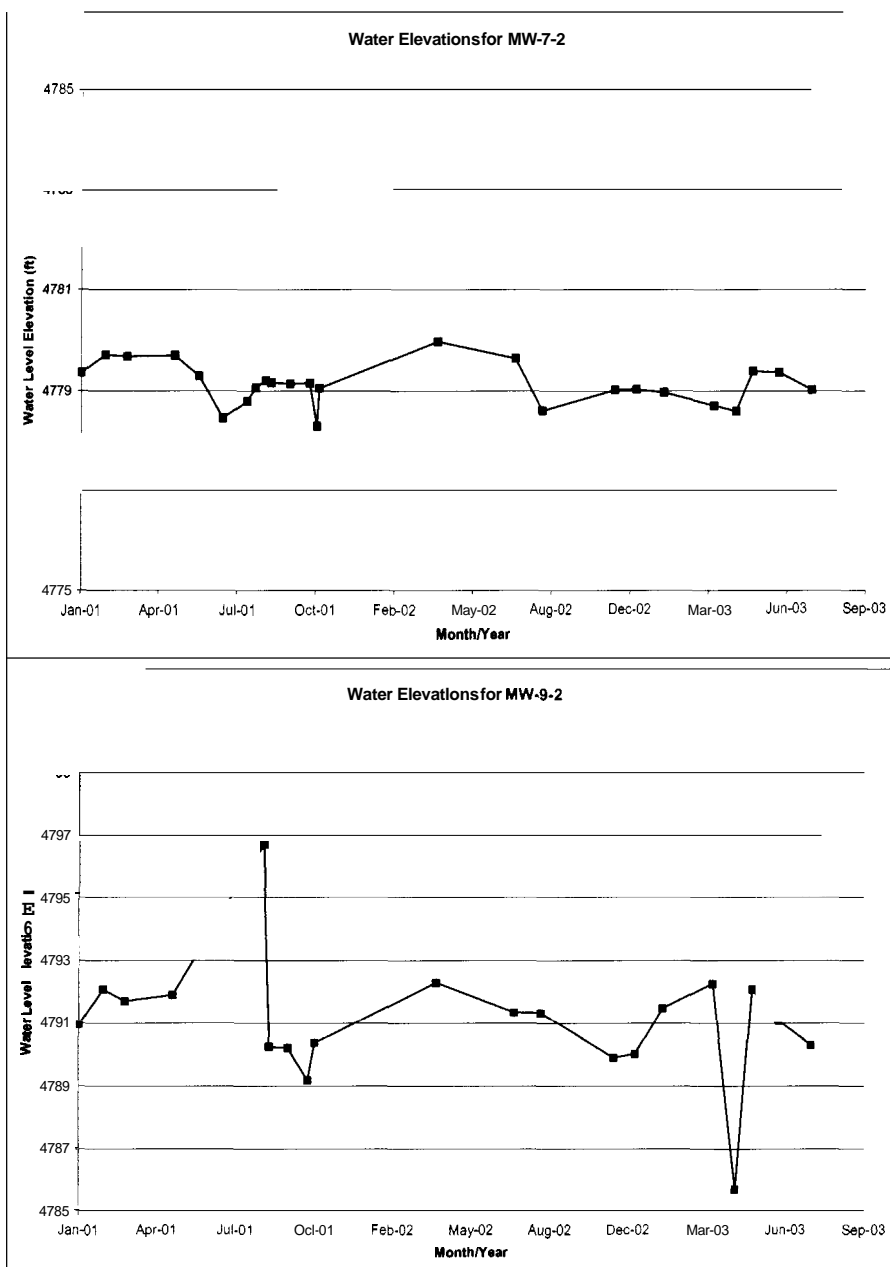
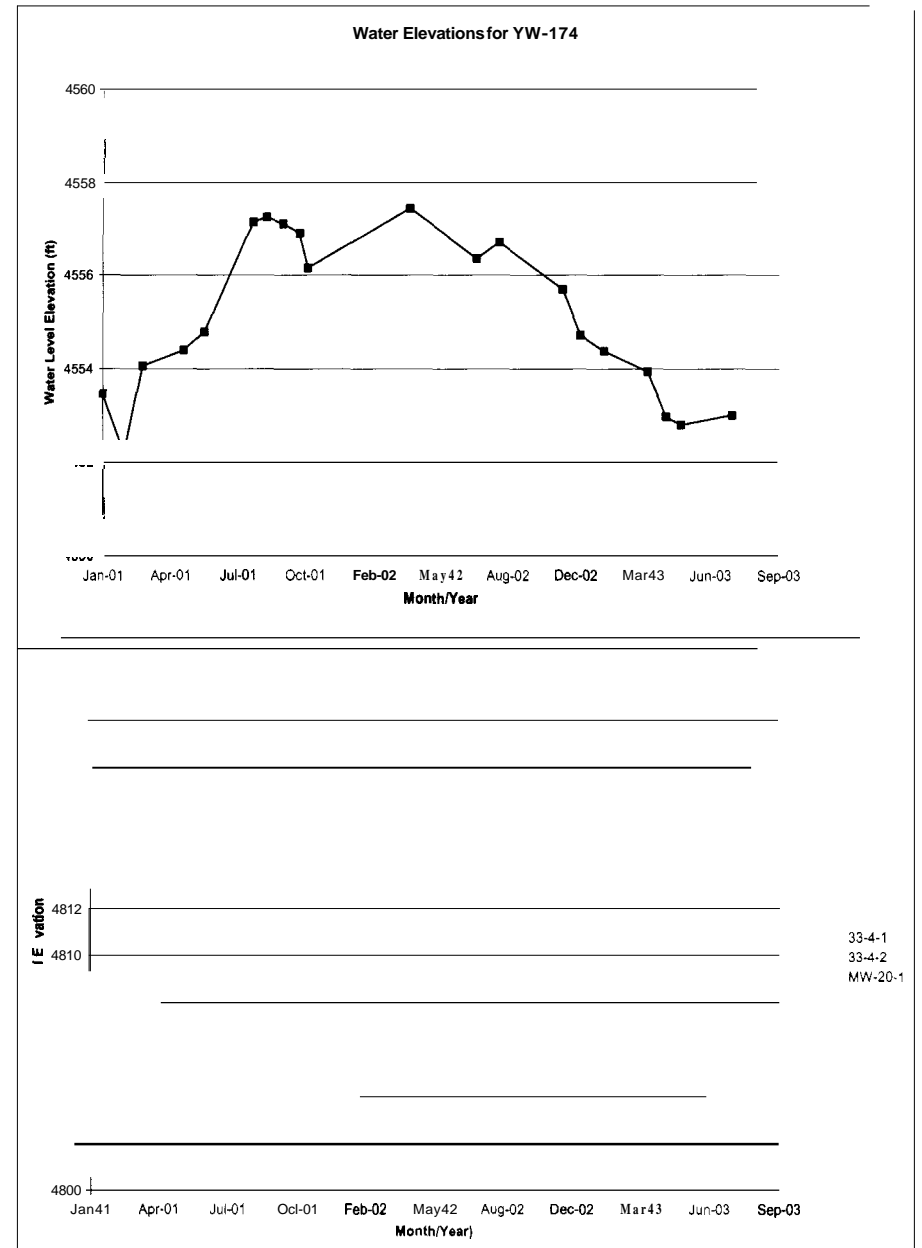
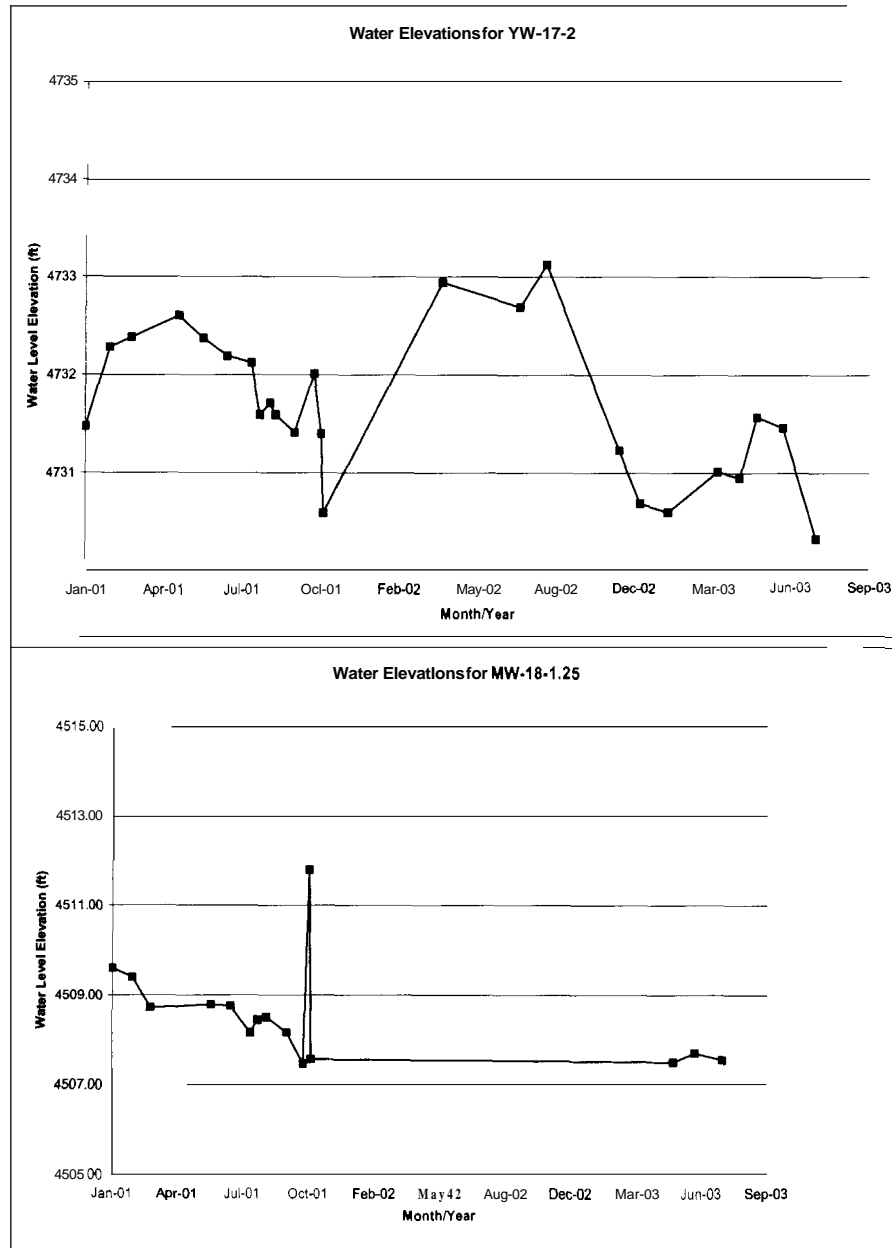


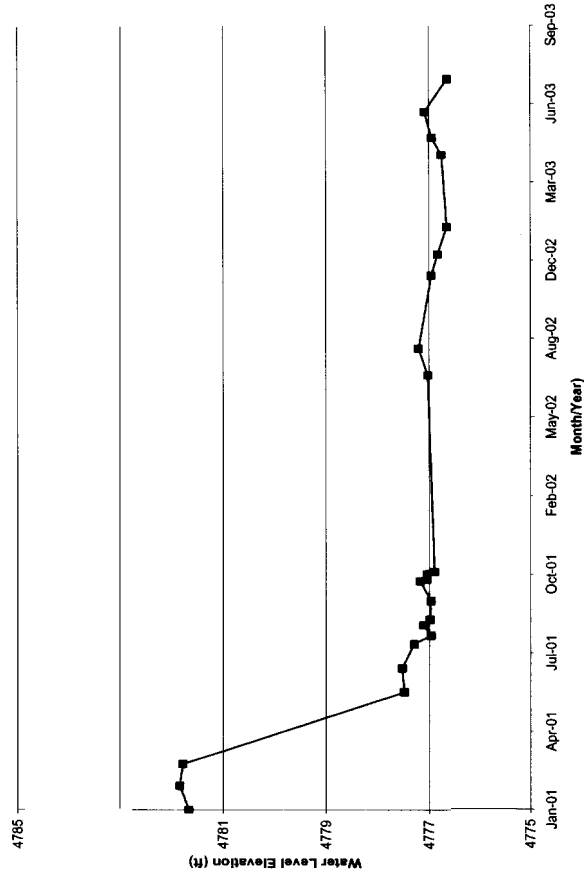
Figure C-2. (continued).



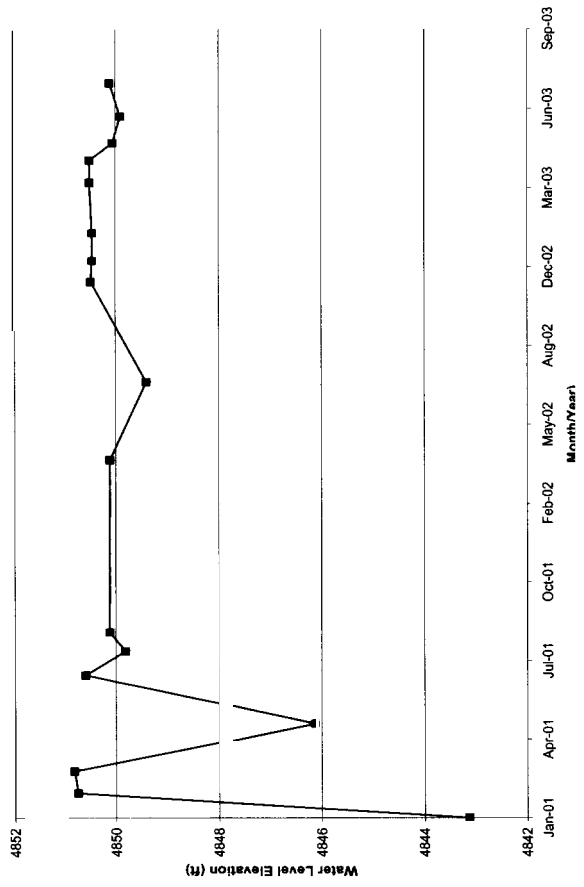
33-4-1
33-4-2
MW-20-1

Figure C-2. (continued).

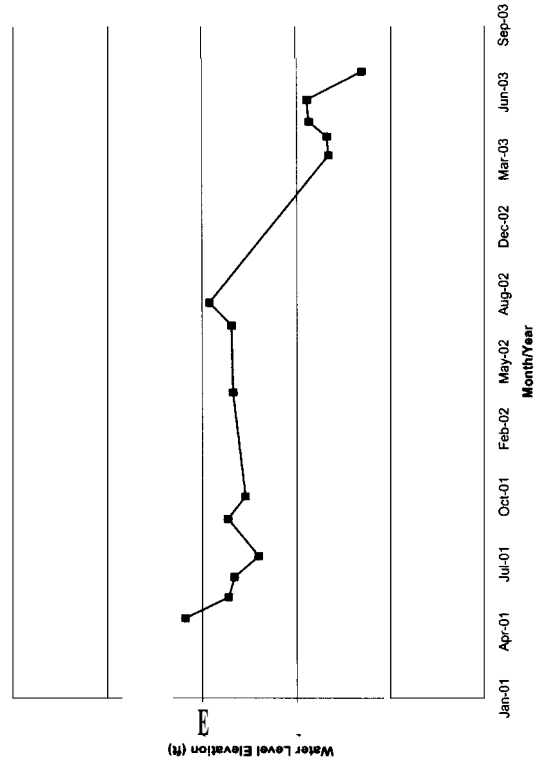
Water Elevations for MW-20-2



Water Elevations for MW-24



Water Elevations for PP-CH-2



Water Elevations for PP-DP-1

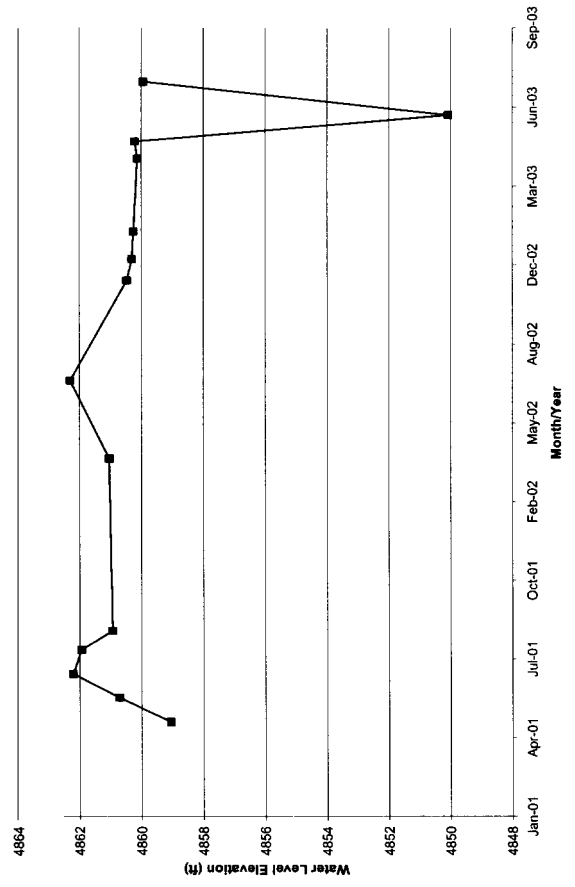


Figure C-2. (continued).

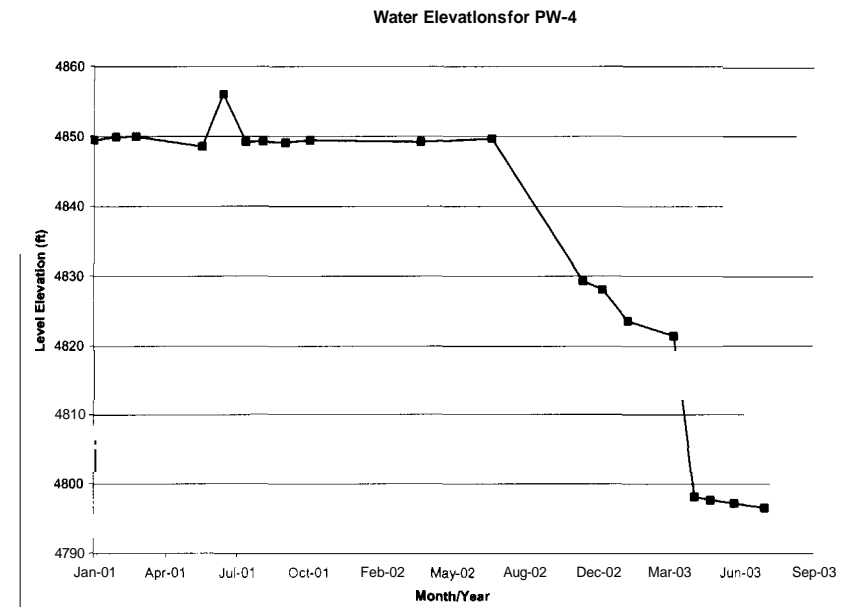
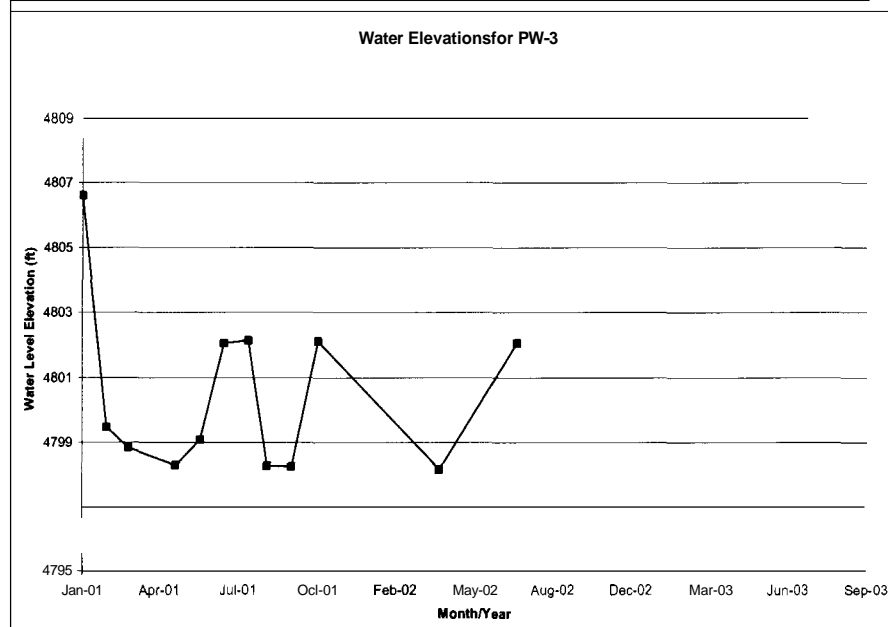
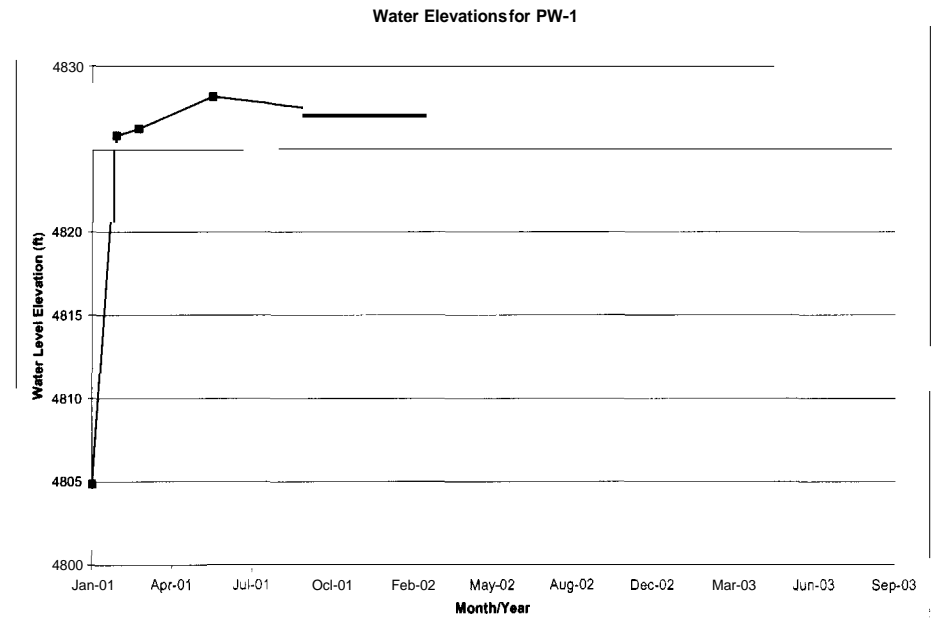
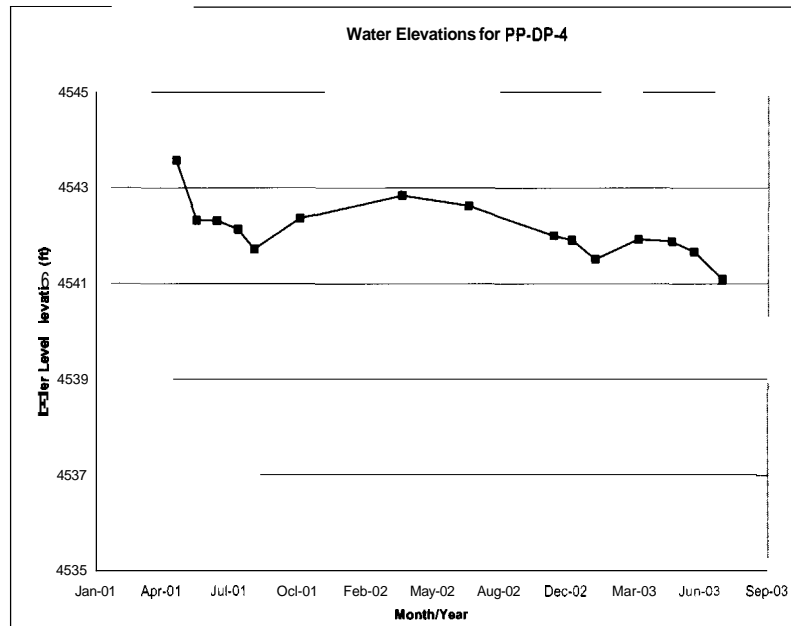
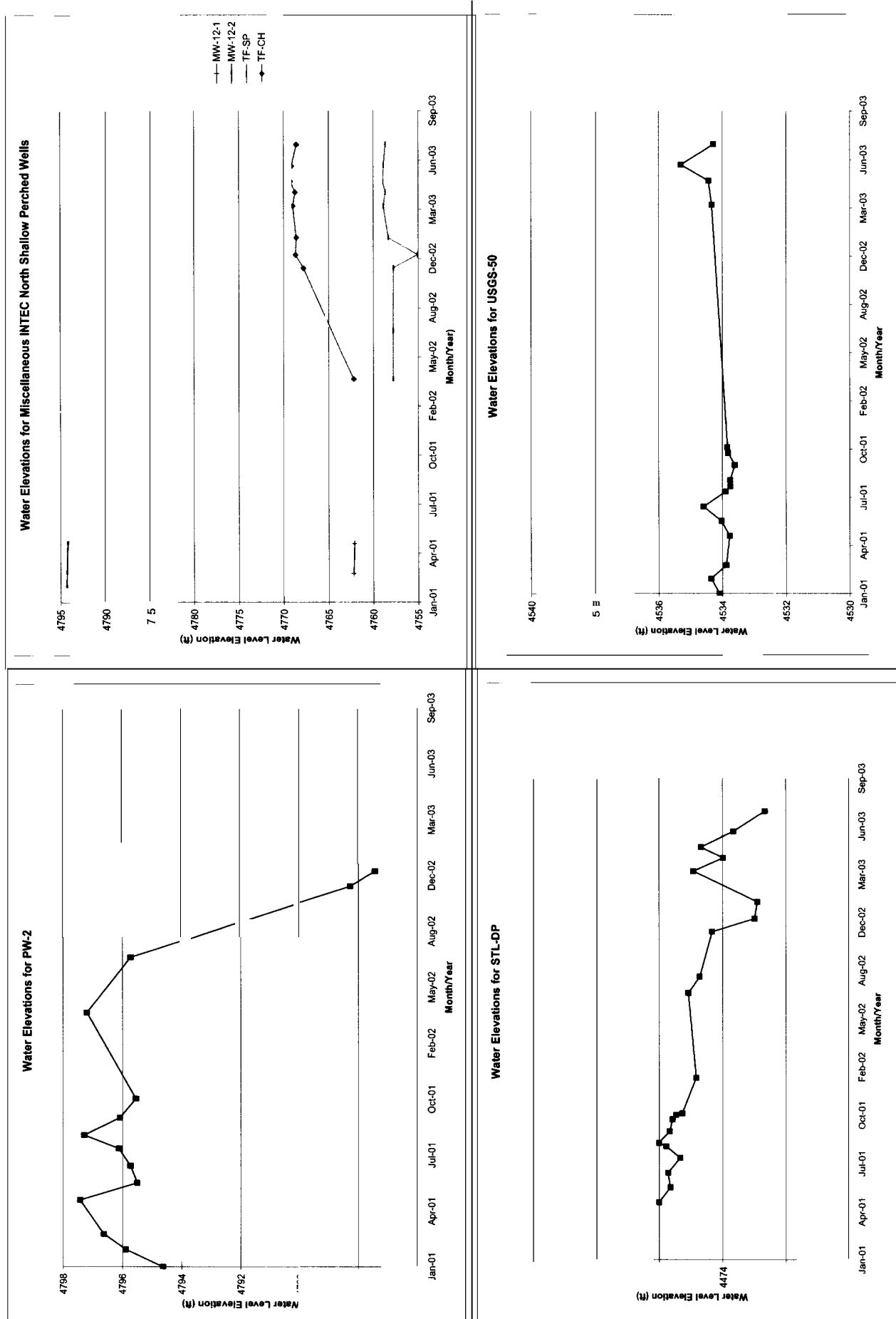


Figure C-2. (continued).



Tensiometer Data

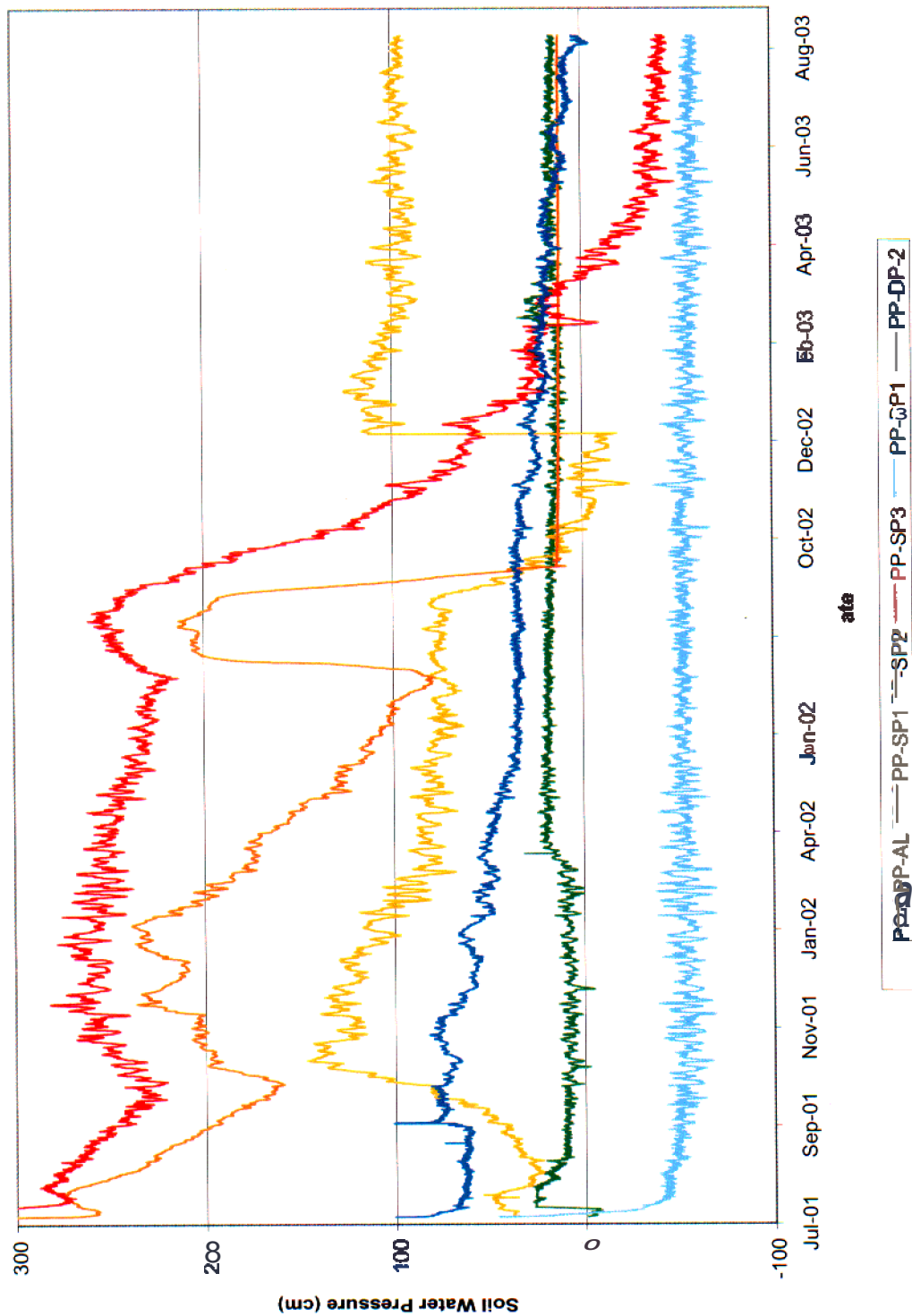
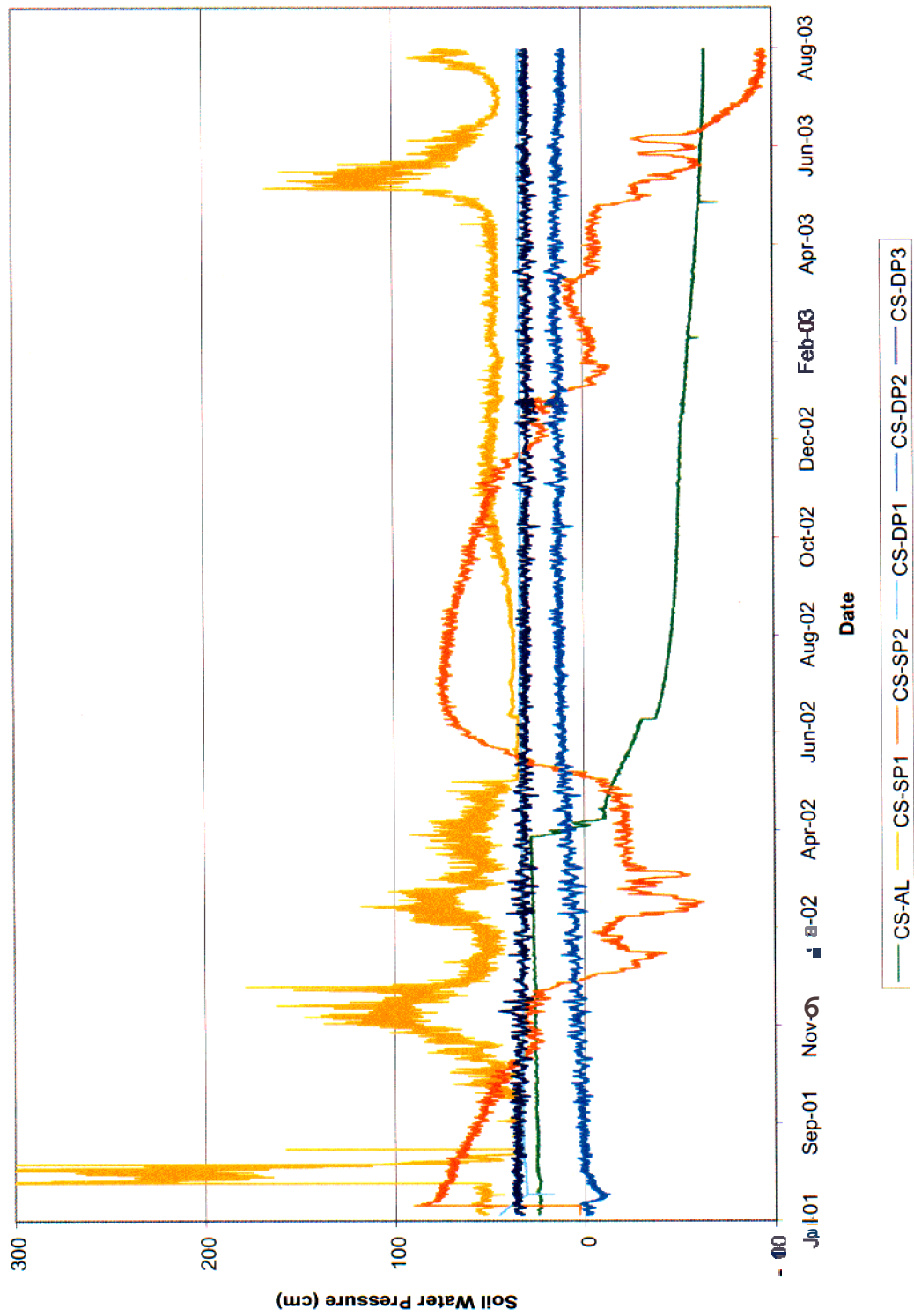


Figure C-3. Percolation Pond Set tensiometer data.



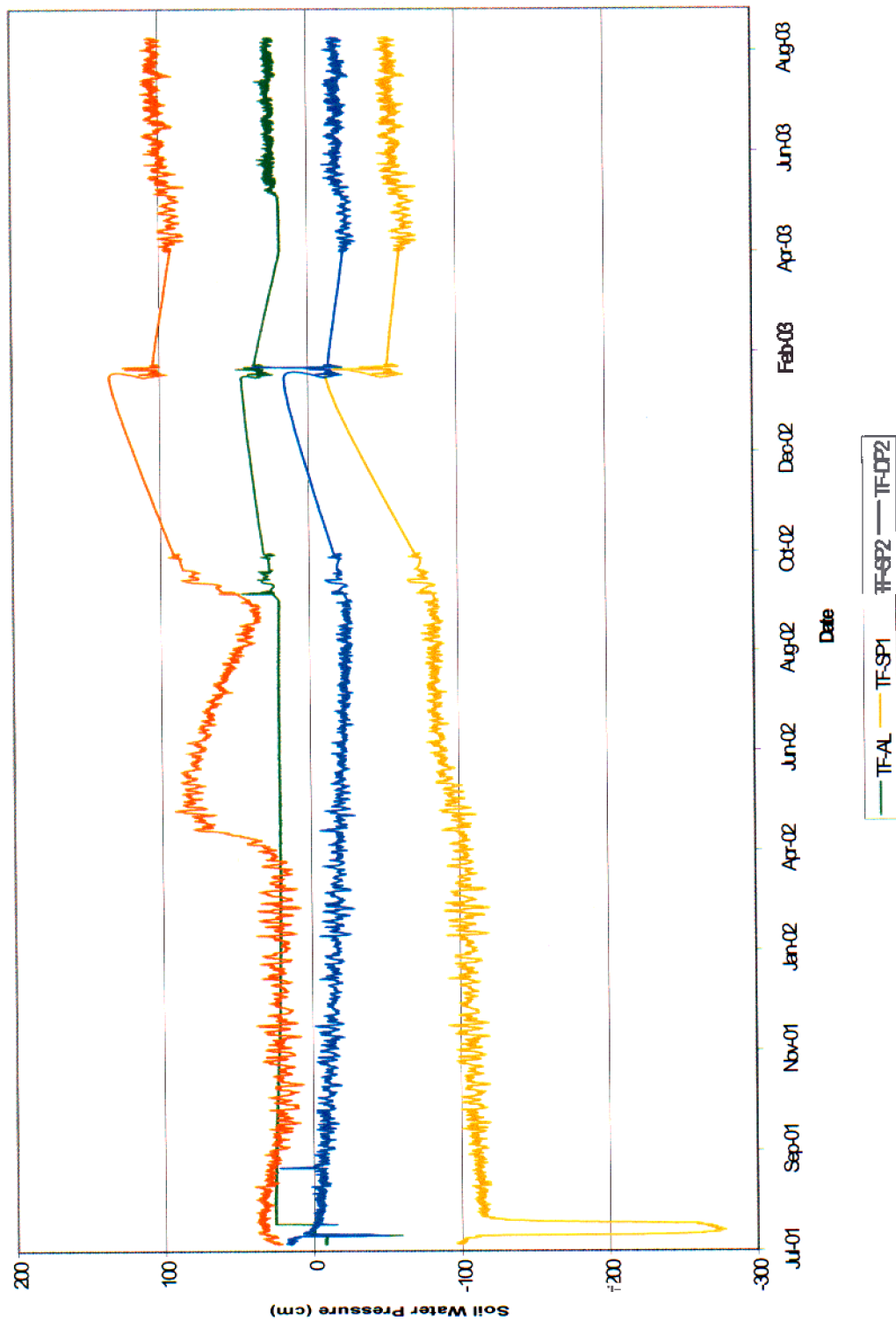


Figure 6-9 Fank Farm Set tensiometer data.

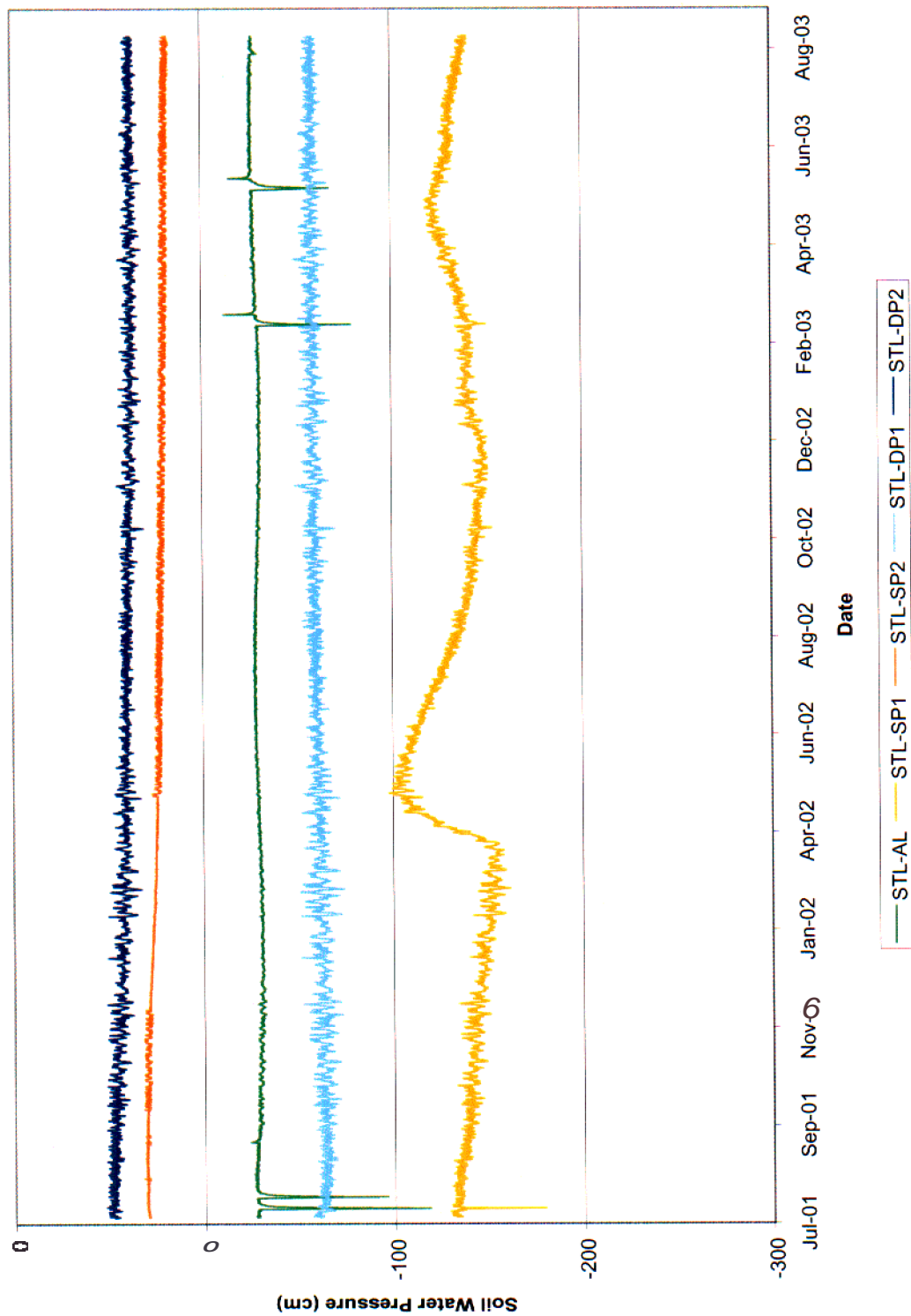


Figure C-6. Sewage Treatment Lagoon Set tensiometer data.

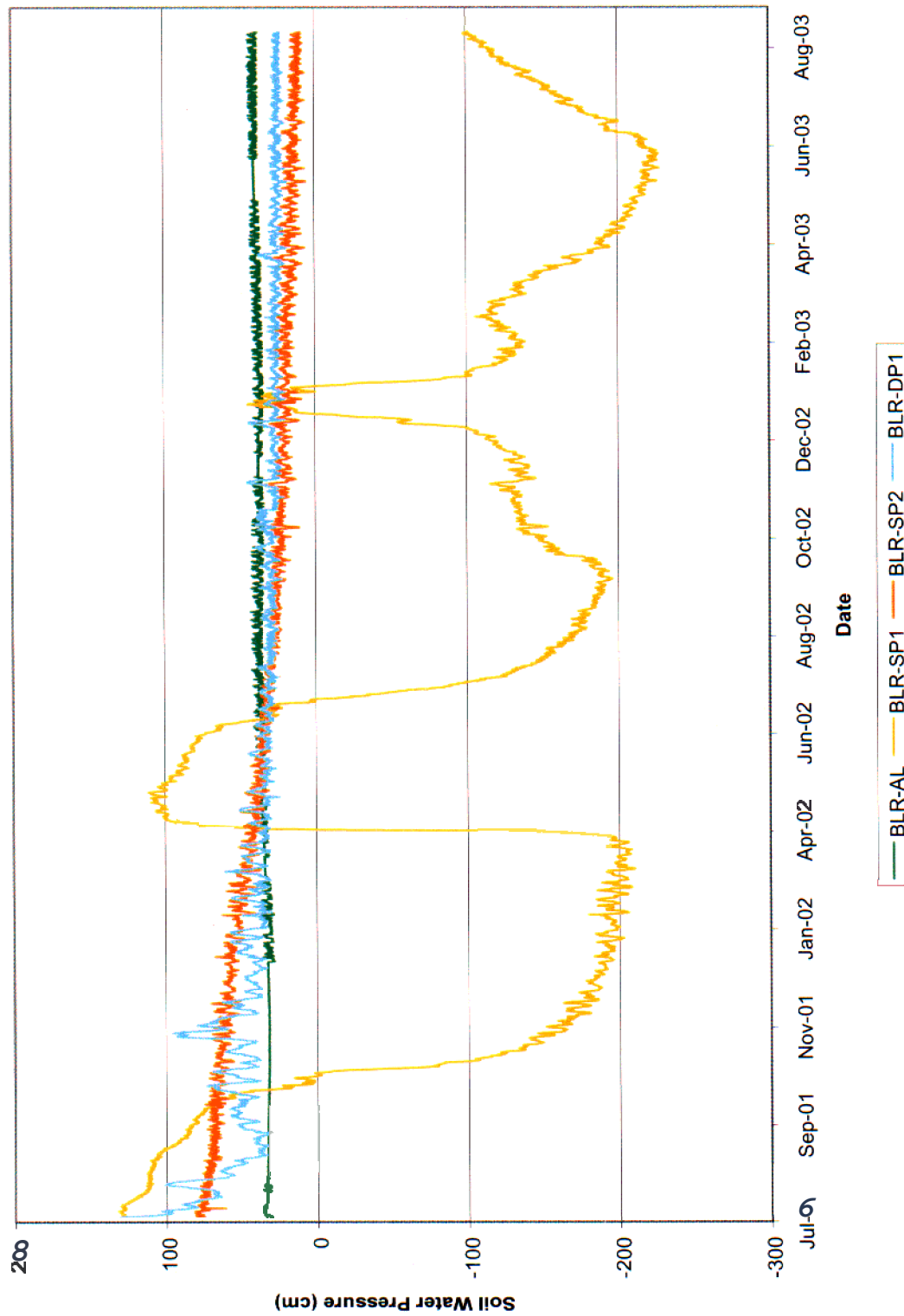


Figure C-7. Big Lost River Set tensiometer data.